315 NORTH MEADOW STREET SITE

TOMPKINS COUNTY

ITHACA, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 755014

Prepared for:

NEW YORK STATE DEPARTMENT OF

ENVIRONMENTAL CONSERVATION

625 BROADWAY, ALBANY, NEW YORK

Prepared by:

URS

257 WEST GENESEE STREET, SUITE 400

BUFFALO, NEW YORK 14202-2657

(716) 856-5636

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

November 2017

CERTIFICATION STATEMENT

I Mark Lang certify that I am currently a NYS registered professional engineer and that this Site Management 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).

_____ P.E.

Sept 27, 2018 DATE

TABLE OF CONTENTS

315 NORTH MEADOW STREET SITE
TOMPKINS COUNTY
ITHACA, NEW YORK
SITE MANAGEMENT PLAN

Table of Contents

List of Tables

List of Figures

List of Appendices

LIST OF ACRONYMS

ASP	Analytical Services Protocol
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EVO	emulsified vegetable oil
EWP	Excavation Work Plan
GHG	Green House Gas
HASP	Health and Safety Plan
IC	Institutional Control
IRM	Interim Remedial Measure
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operations and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCE	tetrachloroethene
PID	Photoionization Detector

PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Soil Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCE	trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VFA	volatile fatty acids
VOC	Volatile Organic Compound

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: #755014 315 North Meadow Street, Ithaca, NY

Institutional Controls:	1. The property may be used for commercial use
	2. All ECs must be operated and maintained as specified in this SMP.
	All ECs must be inspected at a frequency and in a manner defined in the SMP.
	The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Tompkins County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
	Groundwater and other environmental or public health monitoring must be performed as defined in this SMP.
	Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP.
	All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
	Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
	Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.

	Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
	The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 1, and any potential impacts that are identified must be monitored or mitigated.
	Vegetable gardens and farming on the site are prohibited.
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP.
Engineering Controls:	1. Cover system
	2. SSD system

Inspections:	Frequency
1. Cover inspection	Annually
Monitoring:	
1. Groundwater Monitoring Wells	Annually
Maintenance:	
1. Cover System maintenance	As needed
2. SSD System maintenance	As needed
Reporting:	
1. Groundwater and SSD System Data	Annually
2. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 315 North Meadow Street site located in Ithaca, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program Site No. 755014 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Knuppenburg Realty, Inc. (site owner) and Stone Garden Corporation/Angelo Dry Cleaners (site operator) declined to implement a remedial program when requested by the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in Figure 1. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix A.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Tompkins County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix B of this SMP.

This SMP was prepared by URS, on behalf of the NYSDEC in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of 6NYCRR Part 375 and/or Environmental Conservation Law.

- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table 1: Notifications

Name	Contact Information
NYSDEC Project Manager: Michael Mason	(518) 402-9813 michael.mason@dec.ny.gov
NYSDEC Regional HW Engineer: Harry Warner	(315) 426-7551 harold.warner@dec.ny.gov
NYSDEC Site Control: Kelly Lewandowski	kelly.lewandowski@dec.ny.gov
NYSDOH: Mark Sergott	(518) 402-7860 mark.sergott@health.ny.gov

Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Ithaca, Tompkins County, New York and is identified as Section 59 Block 3 and Lot 1 on the City of Ithaca Tax Map (see Figure 2). The site is an approximately 0.2-acre area and is bounded by asphalt and/or concrete paved parking surfaces to the north, a gravel parking area to the south, a grass area to the east, and asphalt and/or concrete paved parking surfaces to the west (see Figure 1 – Site Location). The boundaries of the site are more fully described in Appendix A –Environmental Easement. The owner of the site parcel at the time of issuance of this SMP is Knuppenburg Realty, Inc.; the site operator is Stone Garden Corporation/Angelo Dry Cleaners.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a single-story commercial building. The Site is zoned commercial and is currently utilized for commercial uses. Site occupants include a dry cleaner.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial properties. The properties immediately south of the Site include commercial properties; the properties immediately north of the Site include commercial properties; the properties immediately east of the Site include commercial properties; and the properties to the west of the Site include commercial properties.

2.2.2 Geology

An approximately 2 to 4-foot fill layer of clay and silt mixed with some ash, wood, cinder, and gravel, is present across the site. The fill overlies a 7 to 19-foot clay and silt unit containing thin and discontinuous sand and silt layers. The clay and silt layer overlies sand that transition to a unit of silt at approximately 26 feet below ground surface (bgs). Site-specific boring logs are provided in Appendix C.

2.2.3 Hydrogeology

Groundwater is generally found at approximately 4 to 5 feet bgs. The shallow overburden water table is fairly flat and the deep overburden (14-19 feet bgs) hydraulic gradient decreases in elevation to the north. Groundwater contour maps are shown in Figures 3 and 4. Groundwater elevation data is shown on the figures. Groundwater monitoring well construction logs are provided in Appendix C.

2.3 Investigation and Remedial History

In March 2006, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is where hazardous waste presents a significant threat to the public health or the environment and action is required. Investigations conducted at the Site include the following:

- Environmental Site Assessment conducted in connection with a potential property transaction for an adjacent property completed by Buck Engineering in 2005;
- Preliminary Site Assessment completed by URS in 2005;
- Off-site soil vapor intrusion investigation completed by URS in 2006; and
- Remedial Investigation/Feasibility Study (RI/FS) completed by URS in April 2010.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Record of Decision dated October 18, 2010 are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.
- Prevent inhalation of contaminants from groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to meet ambient groundwater quality criteria, to the extent practicable.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of contaminants volatilizing from soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the indoor air of buildings at or near the site.

2.5 Remaining Contamination

2.5.1 Soil

The areas of excavation are shown on Figure 5. NYSDEC Part 375 soil cleanup objectives (SCOs) for Unrestricted Use were exceeded for tetrachloroethene (PCE) and/or methylene chloride in samples DOC-Area II, DOC-Area III, DOC-Area IIIB, DOC-Area V (methylene chloride only), DOC-Area VIA, and DOC-Area VIB (methylene chloride only). SCOs for Residential Use are exceeded for PCE in DOC-Area II and DOC-Area III. No SCOs are exceeded for restricted residential, commercial, or industrial use. Table 2 and Figure 6

summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs and the Residential Use SCOs at the site after completion of remedial action.

TABLE 2
ANALYTICAL RESULTS FROM SOIL CONFIRMATION SAMPLES
315 NORTH MEADOW STREET
ITHACA, NEW YORK

Use Criteria	**PCE**	**TCE**	**Methylene Chloride**
Unrestricted Use and Protection of Groundwater	1.3	0.47	0.05
Residential	5.5	10	51
Restricted Residential	19	21	100
Commercial	150	200	500
DOC-Area I	0.2	0.004	0.011
DOC-Area II	**13.0**		**1.4**
DOC-Area III	**16.0**		**1.5**
DOC-Area IIIB	**5.2**		**1.4**
DOC-Area IV	0.59		0.03
DOC-Area V	0.47		**0.2**
DOC-Area VIA	**2.6**		**3.6**
DOC-Area VIB	0.6		**0.4**

Notes
Samples collected October 2011
Results in mg/kg (ppm)
Part 375 Soil Cleanup Objectives
Exceeds Unrestricted Use and Protection of Groundwater Criteria
Exceeds Residential Use Criteria

2.5.3 Groundwater

Figure 7 summarizes the results of all samples of groundwater that exceed the NYSDEC standards, criteria, and guidance (SCGs) after completion of the remedial action. Results are discussed below.

2.5.3.1 Onsite and Upgradient PCE

As indicated on Figure 7, PCE exceeds groundwater criteria at two monitoring well locations: upgradient monitoring well NM-MW-06S (southwest of the building) and in NM-MW-05S (south of the east side of the building).

- The PCE concentration in NM-MW-06S at 160 ppb in March 2015 is similar to historic concentrations in this monitoring well which ranged from 120 to 310 ppb between September 2011 and December 2014. This monitoring well location is considered upgradient of the site, and has not been impacted by site remediation.
- The PCE concentration in NM-MW-05S at 950 ppb in March 2015 is significantly less than the Baseline Monitoring concentration in September 2011 of 22,000 ppb. PCE concentrations in this monitoring well steadily decreased over the injection events such that the concentration is below 1 ppm.

2.5.3.2 Onsite and Upgradient PCE Degradation Products

PCE degradation products include: trichloroethylene (TCE), cis-1,2-dichloroethene, and vinyl chloride. In March 2015, TCE exceeds groundwater criteria at two monitoring well locations: upgradient monitoring well NM-MW-06S (southwest of the building) and in NM-MW-05S (south of the east side of the building).

- The TCE concentration in NM-MW-06S at 20 ppb in March 2015 is similar to historic concentrations in this monitoring well which ranged from 14 to 34 ppb between September 2011 and December 2014. This monitoring well location is considered upgradient of the site, and has not been impacted by site remediation.
- The TCE concentration in NM-MW-05S at 320 ppb in March 2015 is less than the Baseline Monitoring concentration in September 2011 of 770 ppb. TCE concentrations in this monitoring well steadily rose before decreasing over the injection events as PCE concentrations decreased.

As PCE has been reduced at the site, concentrations of cis-1,2-dichloroethene and vinyl chloride have increased.

- In March 2015, cis-1,2-dichloroethene concentrations exceed groundwater criteria: in upgradient monitoring well NM-MW-06S (220 ppb); onsite shallow monitoring wells

NM-MW-9D (980 ppb), NM-MW-05S (960 ppb), NM-MW-11S (110 ppb); onsite deep monitoring wells: onsite NM-MW-09D (980 ppb), NM-MW-10D (9.4 ppb), and NM-MW-02D (140 ppb).

- Vinyl chloride concentrations have increased especially in the onsite monitoring wells; concentrations of VC have stabilized over the last year.

Because electron donors (as measured by total organic carbon) remain in the source area (11 mg/kg TOC in the latest sampling) and the oxidation/reduction potential remains low (-70 mV in the latest sampling), dechlorination is expected to be ongoing, further reducing concentrations of daughter products TCE, cis-1,2-DCE, and vinyl chloride.

2.5.3.3 Sidegradient and Downgradient Monitoring Wells

- No volatile organic compounds (VOCs) were detected in sidegradient monitoring wells NM-MW-03S/03D, or in downgradient monitoring well NM-MW-08S.
- Only low level exceedances of cis-1,2-dichloroethene at 9.1 ppb (criteria is 5 ppb) and vinyl chloride at 13 ppb (criteria is 2 ppb) were detected in downgradient monitoring well NM-MW-12D.

Since contaminated soil, groundwater, and soil vapor remains beneath the site after completion of the Remedial Action, Institutional and Engineering Controls are required to protect human health and the environment. These ECs/ICs are described in the following sections. Long-term management of these EC/ICs and residual contamination will be performed under the SMP approved by the NYSDEC.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, ICs and ECs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix D) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Record of Decision (ROD) to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to commercial uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 1. These ICs are:

- The property may be used for: commercial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or the Tompkins County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 1, and any potential impacts that are identified must be monitored or mitigated; and

3.3 Engineering Controls

3.3.1 Cover

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of either the structures such as the onsite building,

pavement, and concrete, or a minimum of 12 inches of soil and/or gravel which meets commercial use SCOs for cover material as set forth in 6 NYCRR Part 375-6.8(b). Figure 8 presents the location of the cover system. The EWP provided in Appendix D outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) prepared for the site and provided in Appendix E and the Field Sampling Plan (Appendix H).

3.3.2 Sub-slab Depressurization Systems

Sub-slab depressurization (SSD) systems were installed as an Interim Remedial Measure (IRM) by the NYSDEC at adjacent off-site buildings to address current and/or potential indoor air contamination of VOCs associated with soil vapor intrusion. Operation and maintenance of these systems is under the direction of the NYSDEC and not included herein this SMP.

An additional SSD system was installed by the owner of the site. This system is not maintained by NYSDEC as it is part of the owner's facility. In accordance with Section 4.4.1 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, 2006), the following maintenance activities are required to maintain effective operation of this system.

Every 12 months, the owner shall:

- Perform a visual inspection of the complete system including the vent fan, piping, vacuum monitoring gauge (confirming a minimum vacuum of 1 pascal), and system labeling,
- With the depressurization system operating, use smoke tubes to check for leaks through concrete cracks, floor joints, and at the suction point. Any leaks identified should be resealed until smoke is no longer observed flowing through the opening., and
- Inspection the exhaust or discharge point to verify no air intakes have been located nearby.

3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

3.3.3.1 Cover

The cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.3.2 Sub-Slab Depressurization Systems

The active SSD systems will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that monitoring data indicates that the SSD systems may no longer be required, a proposal to discontinue the SSD systems will be submitted by the remedial party to the NYSDEC and NYSDOH.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in Appendix F.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of groundwater;
- Assessing compliance with applicable NYSDEC SCGs, particularly groundwater standards; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site-wide and Cover Inspection

Site-wide and cover inspections will be performed at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix G – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection and cover will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the

potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater on a routine basis. Sampling locations, required analytical parameters and schedule are provided in Table 3 – Post Remediation Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 3: Post Remediation Sampling Requirements and Schedule

Sampling Location	**Schedule**	
	VOCs (Method 8260C)	Frequency
NM-MW-01S	x	Annually
NM-MW-02S	x	Annually
NM-MW-02D	x	Annually
NM-MW-03S	x	Annually
NM-MW-03D	x	Annually
NM-MW-04S	x	Annually
NM-MW-04D	x	Annually
NM-MW-05S	x	Annually
NM-MW-06S	x	Annually
NM-MW-08S	x	Annually
NM-MW-09D	x	Annually
NM-MW-10D	x	Annually
NM-MW-11S	x	Annually
NM-MW-11D	x	Annually
NM-MW-12D	x	Annually

Detailed sample collection and analytical procedures and protocols are provided in Appendix H – Field Sampling and Analysis Plan and Appendix F – Quality Assurance Project

Plan. Groundwater monitoring will be performed annually to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. Table 4 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, 1 upgradient well, 2 side-gradient wells, 8 on-site wells and 4 downgradient wells are sampled to evaluate the effectiveness of the remedial system. Monitoring well construction logs are included in Appendix C of this document.

Table 4: Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (Northing/ Easting) (SP central)	Well Diameter (inches)	Elevation (above mean sea level)			
				Top of Riser	Casing	Screen Top	Screen Bottom
NM-MW-01S	onsite	890044.3673/ 840426.5530	2	385.45	385.94	380.94	375.94
NM-MW-02S	onsite	889728.8022/ 840453.0144	2	386.57	386.97	383.97	378.97
NM-MW-02D	onsite	889723.6154/ 840453.2271	2	386.53	386.95	374.95	366.95
NM-MW-03S	Side-gradient	889699.1361/ 840372.0667	2	386.16	386.61	381.61	376.61
NM-MW-03D	side-gradient	889691.9366/ 840372.6909	2	387.17	386.63	368.83	359.13
NM-MW-04S	down-gradient	889811.9708/ 840445.3758	2	385.95	386.48	377.48	372.48
NM-MW-04D	down-gradient	889813.203/ 840447.598	1	386.27	386.51	372.51	367.51
NM-MW-05S	onsite	889682.8260/ 840508.4864	2	386.95	387.41	381.41	376.41
NM-MW-06S	upgradient	889646.0494/ 840443.4968	2	386.18	386.74	381.74	376.74
NM-MW-08S	down-gradient	889898.3193/ 840386.1788	2	385.25	385.77	380.77	375.77
NM-MW-09D	onsite	889675.234/ 840447.667	1	386.5	386.81	372.81	367.81

NM-MW-10D	onsite	889678.863/ 840505.318	1	387.09	387.41	373.41	368.41
NM-MW-11S	onsite	889815.617/ 840502.141	1	386.80	387.01	377.01	372.01
NM-MW-11D	onsite	889815.584/ 840499.553	1	386.81	387.00	372.00	367.00
NM-MW-12D	down-gradient	889934.664/ 840431.673	1	386.09	386.36	374.36	369.36

If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable. Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix G - Site Management Forms. Other observations (e.g., groundwater

monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Sampling and Analysis Plan provided as Appendix H of this document.

5.0 OPERATION AND MAINTENANCE PLAN

Operation and maintenance of the SSD systems installed by the NYSDEC as part of the IRM are the responsibility of the NYSDEC.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

Table 5: Vulnerability Assessment

Planning Areas	Current and Expected Stresses to Systems in This Planning Area	Projected Impact of Changes to Systems in This Planning Area (without preparedness action)	Vulnerability Assessment		
			Degree of Sensitivity of Systems in this Planning Area	Adaptive Capacity of Systems in this Planning Area	Vulnerability of Systems in this Planning Area
Flood Control	Increased flooding can render monitoring wells inaccessible for sampling events	Increased precipitation will raise the water table and increase flash flooding, which will flood the monitoring wells with increasing frequency	High-increased risk of flooding will flood monitoring wells with increasing frequency	Medium-To adapt to flash flooding events, monitoring well casing heights can be raised. Nothing can be done to prevent flooding caused by a raised water table.	Medium
	Increased flooding can damage the cover system, raising the risk of contaminant transport	Increased precipitation will raise the water table and increase flash flooding, which will cause damage to the cover system and increase risk of contaminant transport	High-increased risk of flooding will damage the cover system and raise the risk of contaminant transport	Low-Most options are costly as they would include some measure of excavation in order to divert water or change the grade of the cover system. Physical barriers around the site would be minimally effective.	High
Road Operation and Maintenance	Higher temperatures in winter lead to fewer travel disruptions associated with snow and ice	Higher temperatures in winter will lead to fewer travel disruptions associated with snow and ice	High (but positive)-higher temperatures will lead to fewer travel disruptions associated with snow and ice	n/a	Low
	Increased risk of flooding leads to more travel disruptions associated with landslides, road washouts, and flooding	Increased risk of flooding will lead to more travel disruptions associated with landslides, road washouts, and flooding	Moderate-increased risk of flooding will lead to more travel disruptions associated with landslides, road washouts, and flooding	Medium-Vehicles can take another route to get to the site that is less impacted.	Medium
	Higher temperatures increase surface damage to the cover system	Higher temperatures in summer will increase surface damage to the cover system	Moderate-higher temperatures will increase surface damage to the cover system	Low-Other cover materials may be considered, but most likely cover system will require a higher degree of maintenance.	Medium

Table 5 displays the vulnerability assessment performed for the 315 North Meadow Street site, following the guidance of "Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments" (Center for Science in the Earth System, 2007).

The site has a moderate to high vulnerability to flooding. An increase in intense rain events can lead to increased occurrences of flash flooding, as well as an elevated water table. These conditions may cause monitoring wells to flood, and therefore become unavailable for sampling. This risk can be partially mitigated by raising the casing heights of the monitoring wells. Flooding may also damage the site's cover system, which would increase the risk of contaminant transport. Measures to mitigate this risk would likely be costly. Increased flooding would also cause more travel disruptions on the way to the site for sampling events. This can be mitigated by vehicles finding a different route to the site which is less impacted.

The site has a moderate vulnerability to increased temperatures. Higher temperatures in the winter would be a benefit, as there would be fewer travel disruptions associated with snow and ice. However, increased temperatures in the summer would lead to increased surface damage of the cover system.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

- Waste Generation: Due to the use of excavation and emulsified vegetable oil (EVO) injections, no further active remediation is necessary at the site. Therefore, there is no expected waste generation during site management.
- Energy Usage: Due to the use of excavation and EVO injections, no further active remediation is necessary at this site. Therefore, there is no expected energy usage during site management.

- Emissions: The laboratory used for this site for soil and groundwater samples, Upstate Laboratories, Inc., is located in Syracuse, NY, approximately 65 miles from the site. By using a local laboratory, emissions associated with travel to and from the site are decreased. Continued use of a local laboratory during SMP activities should be utilized.
- Water Usage: Due to the use of excavation and EVO/volatile fatty acids (VFA) injections during remediation, no further active remediation is necessary at the site. Therefore, there is no expected water usage during site management.
- Land and/or ecosystems: Due to the use of excavation and EVO/VFA injections during remediation, no further active remediation is necessary at the site. Therefore, there are no expected disturbances of land and/or ecosystems during site management.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the Project Manager feels appropriate, e.g. during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2 Frequency of Groundwater Sampling, Cover Inspection Other Periodic Activities

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct inspections and/or collect samples and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources. Site inspections

and sampling will be done concurrently. Local laboratories will be utilized to the extent practicable.

6.2.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix G – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits; a set of metrics has been developed.

6.3 Remedial System Optimization

A RSO study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's

cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focuses on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix G. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 6 and summarized in the Periodic Review Report.

Table 6: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Annually
Periodic Review Report	Annually, or as otherwise determined by the Department

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A PRR will be submitted to the Department beginning sixteen (16) months after the completion of the remediation. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix A -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.

- Results of the required annual site inspections and severe condition inspections, if applicable.

- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

  – The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document;

  – The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

  – Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

  – Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and

- Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.
- The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*

- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program [and generally accepted engineering practices]; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative] for the site."

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3, upon completion of an RSO, an RSO report must be submitted to the Department for approval. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results

and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

Center for Science in the Earth System (The Climate Impacts Group) Joint Institute for the Study of the Atmosphere and Ocean, University of Washington and King County, Washington. "Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments". September 2007.

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

NYSDOH, 2006, "Guidance for Evaluating Soil Vapor Intrusion in the State of New York", October 2006

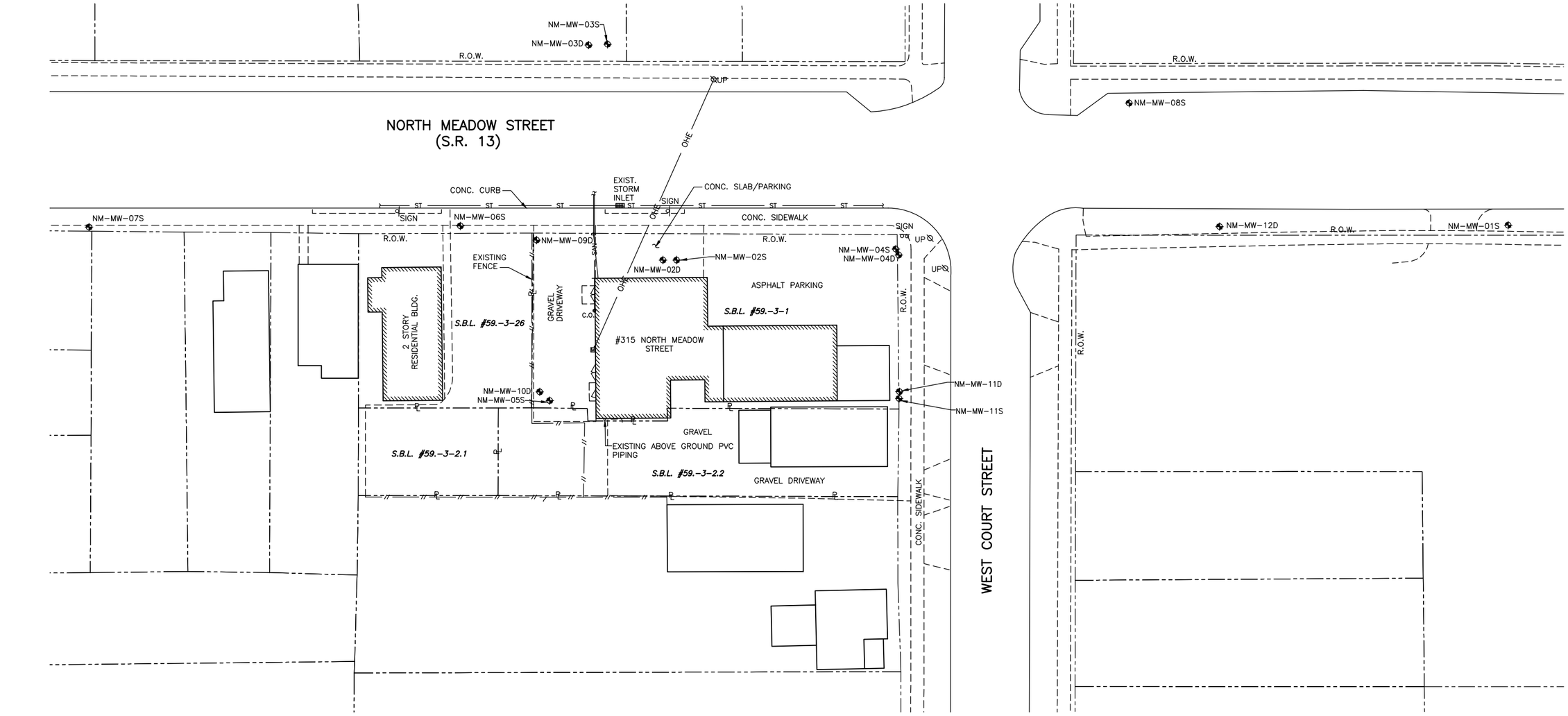
FIGURES

J:\Projects\11174365.00000\DB\GIS\SITE LOCATION.mxd 7/16/2015

URS

315 NORTH MEADOW STREET
SITE LOCATION MAP

FIGURE 1



NOTES:

1. THE EXISTING CONDITIONS AND SITE FEATURES DEPICTED ARE BASED ON VARIOUS RECORD PLAN DATA, ENVIRONMENTAL INVESTIGATIONS AND DATA GATHERED DURING SITE OBSERVATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COORDINATION, INVESTIGATION, AND RESEARCH ACTIVITIES AS DEEMED NECESSARY TO VERIFY EXISTING CONDITIONS. THE CONTRACTOR SHALL BE AWARE THAT THE PLANS MAY VARY FROM ACTUAL FIELD CONDITIONS, AND ANY DISCREPANCIES SHALL BE SUBMITTED IN WRITING TO THE RESIDENT ENGINEER.
2. THE UTILITIES SHOWN HAVE NOT BEEN FIELD LOCATED AND ARE FROM RECORD PLAN ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COORDINATION AND PROTECTION EFFORTS AS DESCRIBED IN THE CONTRACT SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ANY POTENTIAL ONSITE OR OFFSITE INLETS/CATCH BASINS FROM POTENTIAL RUNOFF DURING CONSTRUCTION ACTIVITIES.

20' 0 20'
SCALE IN FEET

NO.	MADE BY	APPROVED BY	DATE	DESCRIPTION

REVISIONS

DESIGNED BY: KAC
DRAWN BY: RAL
CHECKED BY: CED
PROJ. MANGR. JAS

URS Corporation
New York
257 W Genesee St, Buffalo, New York 14202
(716)856-5636 - (716)856-2545 fax

JOB NO. 11176513.00005

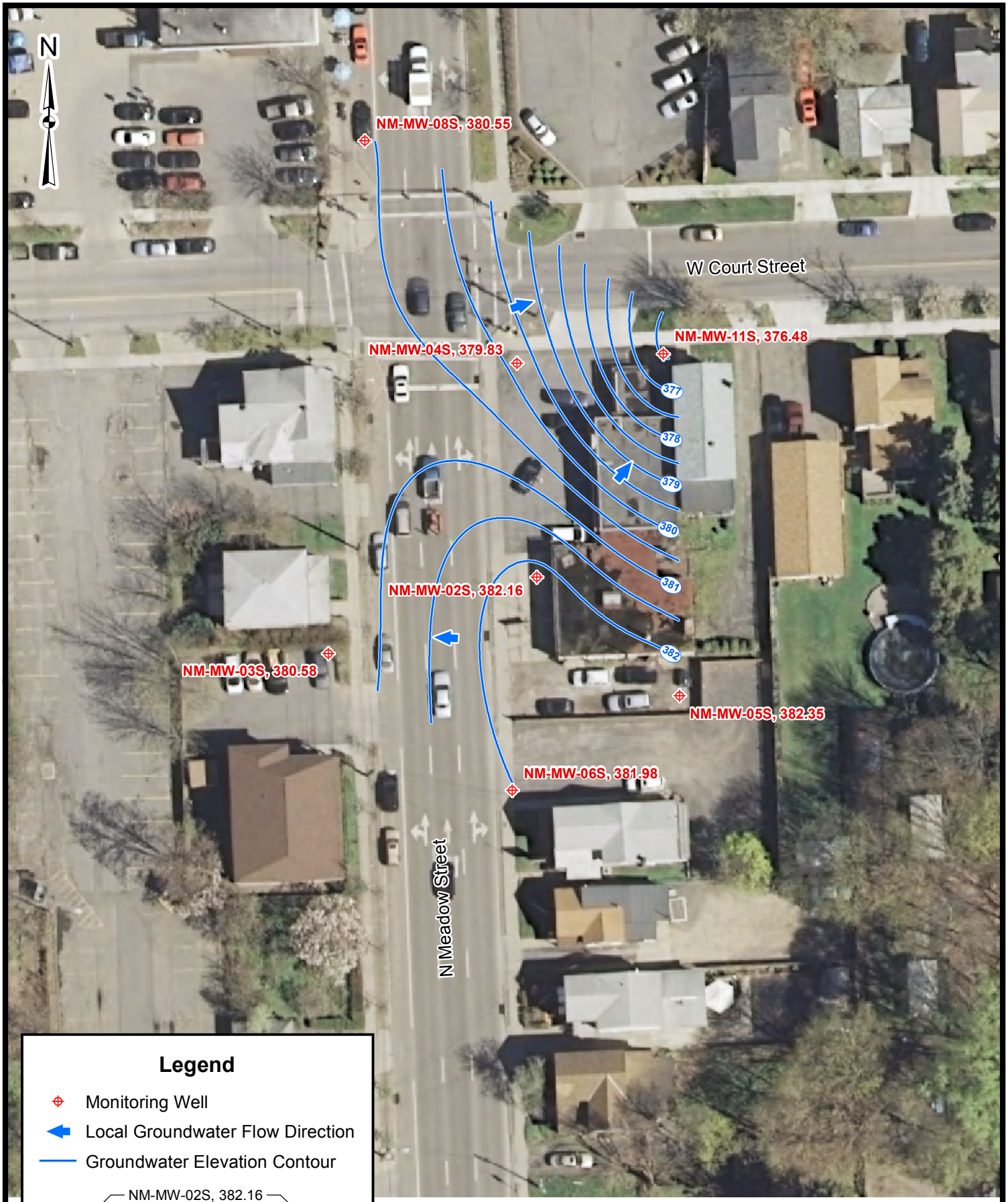
NYSDEC DIVISION OF ENVIRONMENTAL REMEDIATION
WORK ASSIGNMENT D004433-28

SITE MANAGEMENT PLAN
315 NORTH MEADOW STREET

SITE LAYOUT MAP

Scale: AS SHOWN | Date: JULY 2015 | FIGURE 2

J:\Projects\11176513\CAD\CCR FOR INJECTION\SITE MANAGEMENT PLAN\FIGURE 2.dwg 1=1 7/21/2015-2 RAL



J:\Projects\11174365.00000\DB\GIS\20150303 GW CONTOURS SHALLOW.mxd 7/2/2015

URS

315 NORTH MEADOW STREET
SHALLOW GROUNDWATER ELEVATION CONTOURS
MARCH 3, 2015

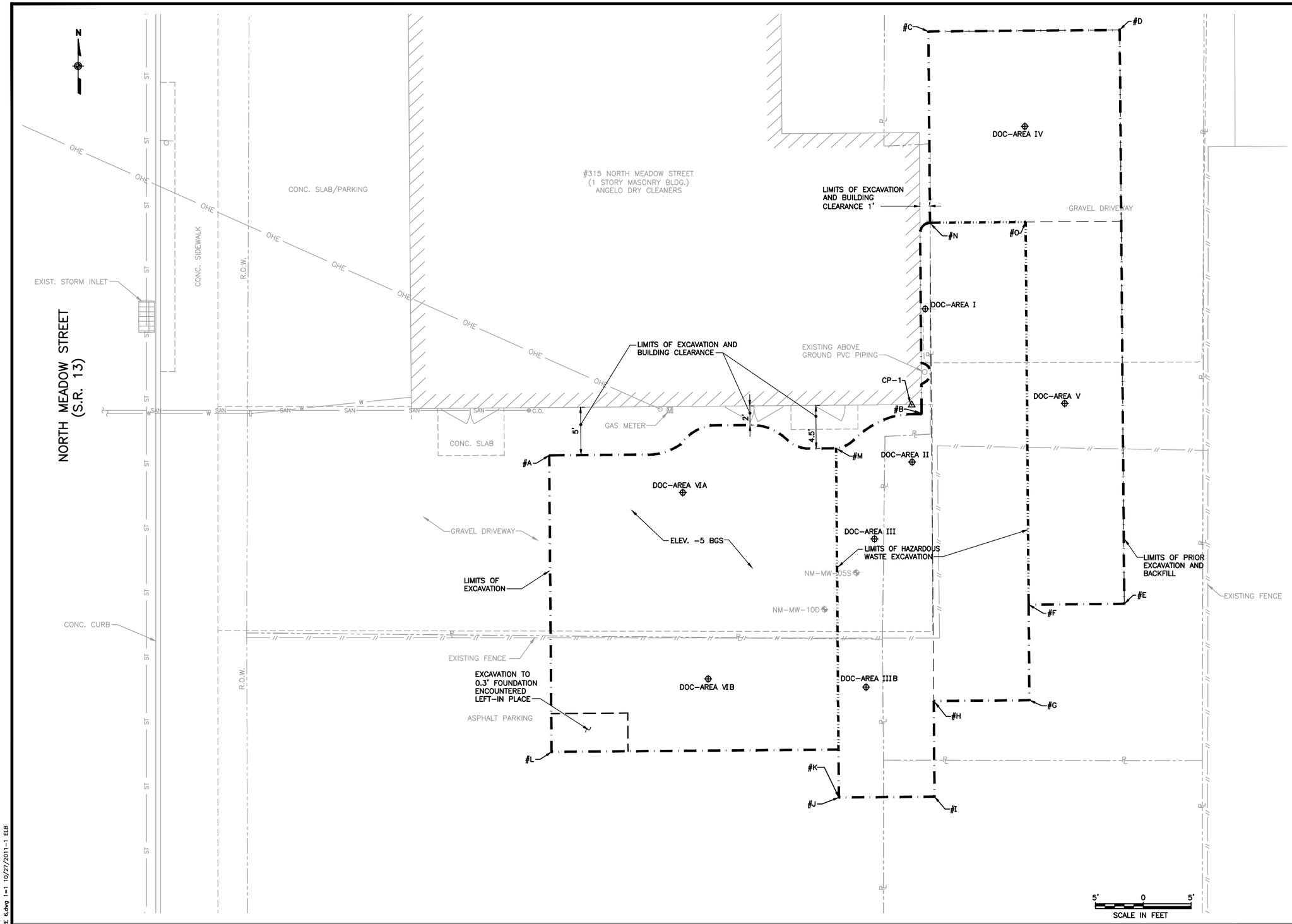
FIGURE 3

J:\Projects\11174365.00000\DB\GIS\20150303 GW CONTOURS DEEP.mxd 7/2/2015

URS

315 NORTH MEADOW STREET
DEEP GROUNDWATER ELEVATION CONTOURS
MARCH 3, 2015

FIGURE 4



SURVEY CONTROL DATA			
POINT #	NORTHING	EASTING	ELEVATION
CP-1	889,700.7	840,514.6	0 BGS
POINT #	X	Y	ELEVATION
A	-39	-5	0
B	0	-1	0
C	1	39	0
D	21	39	0
E	21	-21	0
F	11	-21	0
G	11	-31	0
H	1	-31	0
I	1	-41	0
J	-9	-41	0
K	-9	-36	0
L	-39	-36	0
M	-9	-1	0
N	19	1	0

LEGEND:

⊕ SOIL DOCUMENTATION SAMPLE LOCATION

I:\11176513\CAD\CORFIGURE 6.dwg 1=1 10/27/2011-1 ELB

NO.	MADE BY	APPROVED BY	DATE	DESCRIPTION

REVISIONS

DESIGNED BY: ___
DRAWN BY: ___
CHECKED BY: ___
PROJ. MANGR. ___

URS Corporation
New York
257 W. Genesee St., Buffalo, New York 14202
(716)856-5636 - (716)856-2545 fax

JOB NO. 11176513.00002

NYSDEC DIVISION OF ENVIRONMENTAL REMEDIATION
WORK ASSIGNMENT D004433-28

REMEDIAL DESIGN
315 NORTH MEADOW STREET

ACTUAL EXCAVATION LIMITS AND SOIL DOCUMENTATION SAMPLE LOCATIONS

Scale: AS SHOWN | Date: OCT. 2011 | FIGURE 5

N

N MEADOW ST

W COURT ST

DOC-AREA VIA	CRIT	8/11
VOCs:		
Methylene Chloride	0.05	3.6
Tetrachloroethene	1.3	2.6

DOC-AREA VIB	CRIT	8/11
VOCs:		
Methylene Chloride	0.05	0.38

DOC-AREA IIIB	CRIT	8/11
VOCs:		
Methylene Chloride	0.05	1.4
Tetrachloroethene	1.3	5.2

DOC-AREA IV

DOC-AREA I

DOC-AREA V	CRIT	8/11
VOCs:		
Methylene Chloride	0.05	0.2

DOC-AREA II	CRIT	8/11
VOCs:		
Methylene Chloride	0.05	1.4
Tetrachloroethene	1.3	13

DOC-AREA III	CRIT	8/11
VOCs:		
Methylene Chloride	0.05	1.5
Tetrachloroethene	1.3	16

Legend

■ Soil Sample Location

NOTES: Concentrations in mg/kg

CRITERIA (CRIT): 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use and Protection of Groundwater.

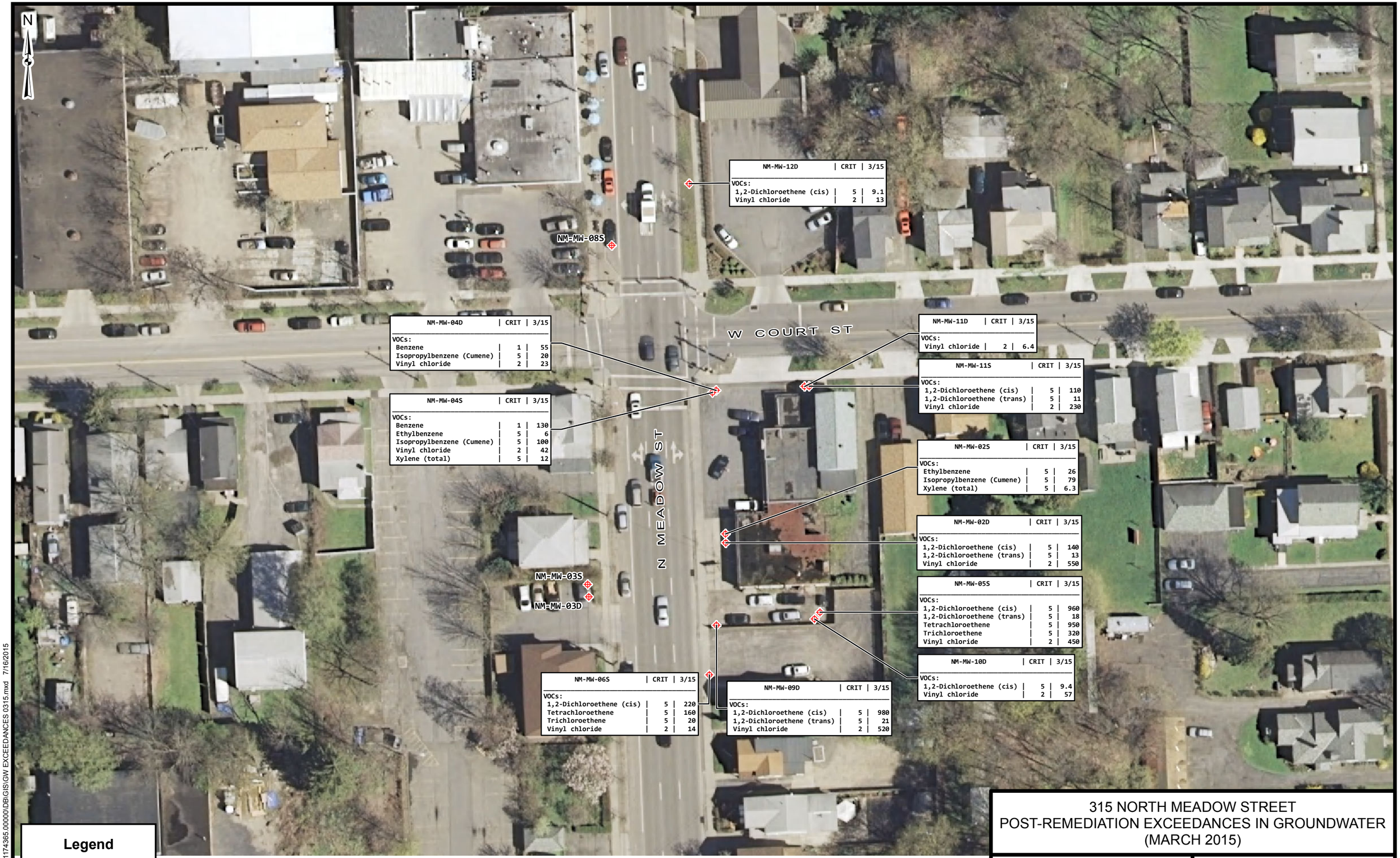
50 0 50 Feet

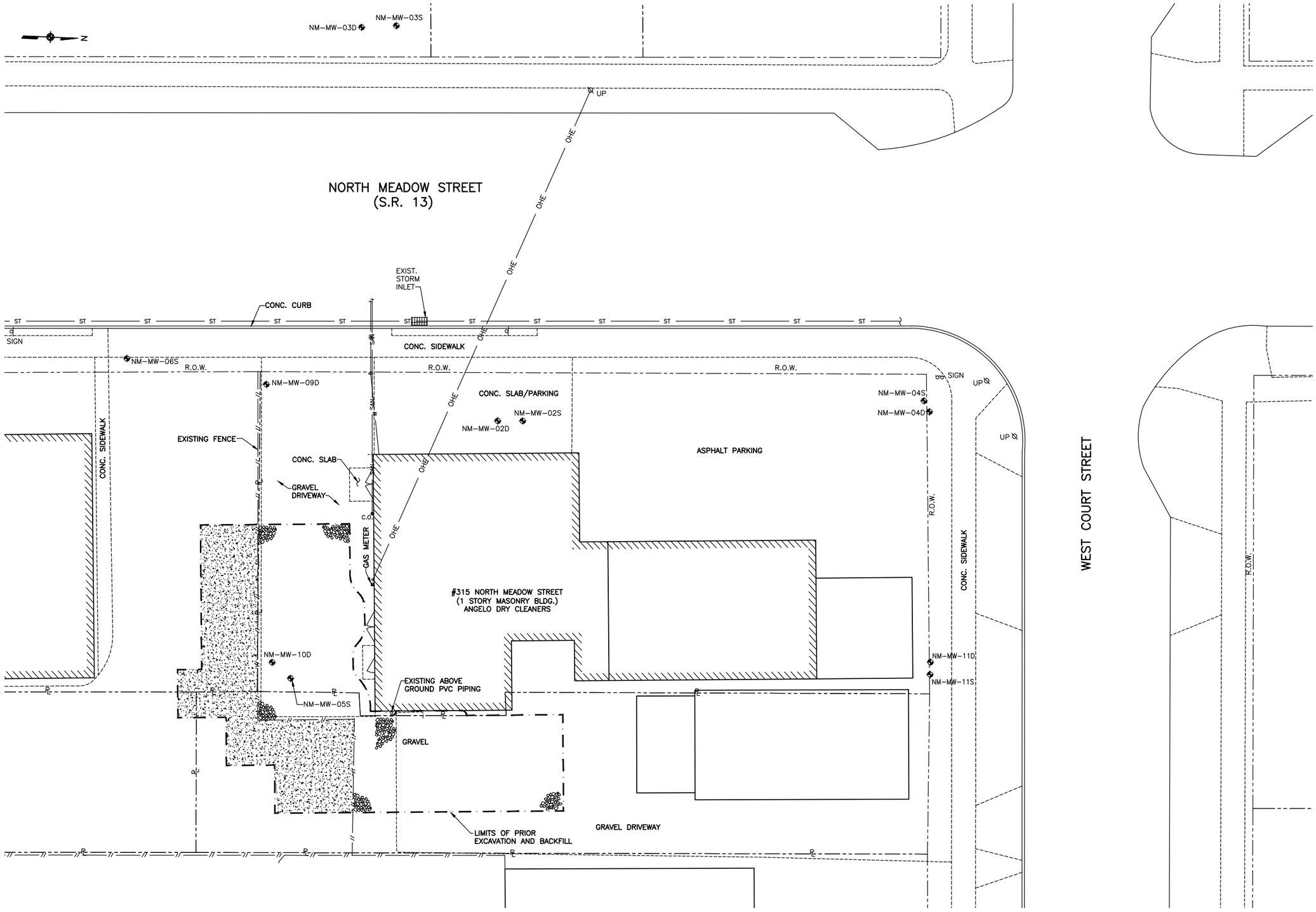
315 NORTH MEADOW STREET
POST-REMEDIATION EXCEEDANCES IN SOIL
(AUGUST 2011)

URS

FIGURE 6

J:\Projects\11174365.00000\DB\GIS\SO EXCEEDANCES 0811.mxd 7/16/2015


N
NM-MW-08S
NM-MW-03S
NM-MW-03D
W COURT ST
N MEADOW ST
NM-MW-12D | CRIT | 3/15
VOCs:
1,2-Dichloroethene (cis) | 5 | 9.1
Vinyl chloride | 2 | 13
NM-MW-04D | CRIT | 3/15
VOCs:
Benzene | 1 | 55
Isopropylbenzene (Cumene) | 5 | 20
Vinyl chloride | 2 | 23
NM-MW-04S | CRIT | 3/15
VOCs:
Benzene | 1 | 130
Ethylbenzene | 5 | 6
Isopropylbenzene (Cumene) | 5 | 100
Vinyl chloride | 2 | 42
Xylene (total) | 5 | 12
NM-MW-11D | CRIT | 3/15
VOCs:
Vinyl chloride | 2 | 6.4
NM-MW-11S | CRIT | 3/15
VOCs:
1,2-Dichloroethene (cis) | 5 | 110
1,2-Dichloroethene (trans) | 5 | 11
Vinyl chloride | 2 | 230
NM-MW-02S | CRIT | 3/15
VOCs:
Ethylbenzene | 5 | 26
Isopropylbenzene (Cumene) | 5 | 79
Xylene (total) | 5 | 6.3
NM-MW-02D | CRIT | 3/15
VOCs:
1,2-Dichloroethene (cis) | 5 | 140
1,2-Dichloroethene (trans) | 5 | 13
Vinyl chloride | 2 | 550
NM-MW-05S | CRIT | 3/15
VOCs:
1,2-Dichloroethene (cis) | 5 | 960
1,2-Dichloroethene (trans) | 5 | 18
Tetrachloroethene | 5 | 950
Trichloroethene | 5 | 320
Vinyl chloride | 2 | 450
NM-MW-10D | CRIT | 3/15
VOCs:
1,2-Dichloroethene (cis) | 5 | 9.4
Vinyl chloride | 2 | 57
NM-MW-06S | CRIT | 3/15
VOCs:
1,2-Dichloroethene (cis) | 5 | 220
Tetrachloroethene | 5 | 160
Trichloroethene | 5 | 20
Vinyl chloride | 2 | 14
NM-MW-09D | CRIT | 3/15
VOCs:
1,2-Dichloroethene (cis) | 5 | 980
1,2-Dichloroethene (trans) | 5 | 21
Vinyl chloride | 2 | 520
Legend
Monitoring Well
NOTES: Concentrations in µg/L
CRITERIA (CRIT): NYSDEC TOGS 1.1.1 Ambient Water Quality Standards, Class GA
50 0 50 Feet
315 NORTH MEADOW STREET
POST-REMEDIATION EXCEEDANCES IN GROUNDWATER
(MARCH 2015)
URS
FIGURE 7
J:\Projects\11174365.00000\DB\GIS\GW EXCEEDANCES 0315.mxd 7/16/2015



NOTES:

1. THE EXISTING CONDITIONS AND SITE FEATURES DEPICTED ARE BASED ON VARIOUS RECORD PLAN DATA FOLLOWING REMEDIAL EXCAVATION ACTIVITIES, ENVIRONMENTAL INVESTIGATIONS AND DATA GATHERED DURING SITE OBSERVATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COORDINATION, INVESTIGATION, AND RESEARCH ACTIVITIES AS DEEMED NECESSARY TO VERIFY EXISTING CONDITIONS. THE CONTRACTOR SHALL BE AWARE THAT THE PLANS MAY VARY FROM ACTUAL FIELD CONDITIONS, AND ANY DISCREPANCIES SHALL BE SUBMITTED IN WRITING TO THE RESIDENT ENGINEER.
2. THE UTILITIES SHOWN HAVE NOT BEEN FIELD LOCATED AND ARE FROM RECORD PLAN ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COORDINATION AND PROTECTION EFFORTS AS DESCRIBED IN THE CONTRACT SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ANY POTENTIAL ONSITE OR OFFSITE INLETS/CATCH BASINS FROM POTENTIAL RUNOFF DURING CONSTRUCTION ACTIVITIES.

LEGEND:

AGGREGATE DRIVEWAY RESTORATION

RECYCLED CONCRETE AGGREGATE DRIVEWAY RESTORATION

J:\Projects\11176513\CAD\CCR FOR INJECTION\SITE MANAGEMENT PLAN\FIGURE 7.dwg 1=1 7/21/2015-1 ELB

NO.	MADE BY	APPROVED BY	DATE	DESCRIPTION

REVISIONS

DESIGNED BY: KAC
DRAWN BY: RAL
CHECKED BY: CED
PROJ. MANGR. JAS

URS Corporation
New York
257 W. Genesee St., Buffalo, New York 14202
(716)856-5636 - (716)856-2545 fax

JOB NO. 11176513.00005

NYSDEC DIVISION OF ENVIRONMENTAL REMEDIATION
WORK ASSIGNMENT D004433-28

SITE MANAGEMENT PLAN
315 NORTH MEADOW STREET

COVER LOCATIONS

Scale: AS SHOWN | Date: JULY 2015 | FIGURE 8

APPENDIX A – ENVIRONMENTAL EASEMENT

APPENDIX B – LIST OF SITE CONTACTS

Name	**Phone/Email Address**
James Kellogg (tenant)	607-273-6941
Michael Mason (DEC project manager)	518-402-9813 michael.mason@dec.ny.gov
Harry Warner (DEC Regional Engineer)	315-426-7551 harold.warner@dec.ny.gov
Kelly Lewandowski (DEC Site Control)	kelly.lewandowski@dec.ny.gov

APPENDIX C – BORING LOGS/MONITORING WELL CONSTRUCTION LOGS

URS Corporation

TEST BORING LOG

BORING NO. :	NM-MW-01S
PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
SHEET:	1 OF 1
CLIENT:	NYSDEC
JOB NO. :	11175058.00000
BORING CONTRACTOR:	Nothnagle Drilling
NORTHING:	890044.3673 **EASTING:** 840426.5530
GROUNDWATER:	
GROUND ELEVATION:	385.94
DATE STARTED:	8/29/07
DATE FINISHED:	8/29/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Brown

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	HSA	Split Spoon		
				DIA.	4 1/4"	2"		
				WT.		140 lbs.		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-2	3/4/5/7	100	ND/ND	FILL. Dark brown silty fine sand, some coarse sand, dry.		8" Flushmount Casing
						FILL. Dark gray clayey silt, some ash, cinder, and gravel, moist.		Bentonite: 3'-1'
		2-4	3/3/2/4	60	ND/ND	ML. Gray brown CLAY/SILT, moist.		2" Sch. 40 PVC Riser: 5'-0'
-5		4-6	2/3/3/3	100	ND/ND	-less clay 4-5.5'.		#00N (Ricci Bros.) Sand: 10'-3'
						SM. Gray brown silty fine to medium SAND, wet.		
		6-8	2/2/2/1	100	ND/ND	SM. Gray brown very silty, fine to coarse SAND, wet.		10 slot, 2" Sch. 40 PVC Screen: 10'-5'
						ML. Gray CLAYEY SILT, trace fine sand.		
-10		8-10	woh/woh/ woh/2	5	ND/ND	CL. Gray SILTY CLAY in shoe, moist		
						End of boring at 10'.		
-15								
-20								
-25								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

Collected soil sample NM-MW-01S-4-6' and submitted for laboratory analysis of TCL VOCs.

BORING NO. : NM-MW-01S

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
CLIENT:	NYSDEC
BORING CONTRACTOR:	Nothnagle Drilling
GROUNDWATER:	

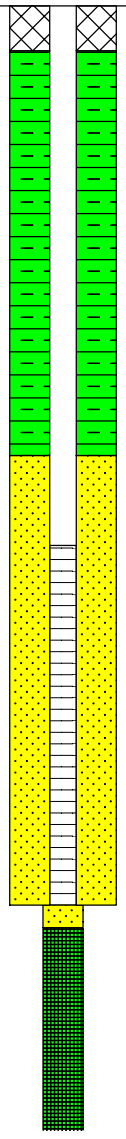
DATE	TIME	LEVEL	TYPE

	CAS.	SAMPLER	CORE	TUBE
TYPE	HSA	Split Spoon		
DIA.	6 1/4"	2"		
WT.		140 lbs.		
FALL		30"		

* POCKET PENETROMETER READING

BORING NO. :	NM-MW-02D
SHEET:	1 OF 2
JOB NO. :	11175058.00000
NORTHING:	889723.6154 EASTING: 840453.2271
GROUND ELEVATION:	386.95
DATE STARTED:	8/27/07
DATE FINISHED:	8/27/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Bruce

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-1	NA	NA	NA	Concrete		8" Flushmount Casing
		1-2	NA/NA/1/3	70	ND/ND	FILL. Gravel Subbase		
		2-4	2/1/1/2	50	ND/ND	FILL. Dark gray to black Silt, some medium to coarse sand and fine gravel, damp.		
-5		4-6	2/3/3/3	80	ND/ND	ML. Brown SILTY CLAY		
		6-8	2/1/2/2	100	ND/23.3	ML. Gray brown CLAYEY SILT. Becomes moister, grayer, and siltier at 5.5'. Slight Petroleum odor 5.5-6.0'.		Bentonite: 10'-1'
		8-10	woh/woh/1/2	0	NA	ML. Gray brown SILTY CLAY to CLAYEY SILT, moist, with moister and siltier zone from 7.0-7.3'		2" Sch. 40 PVC Riser: 12'-0'
-10		10-12	1/2/1/2	10	ND/ND	NO RECOVERY		
		12-14	wor/wor/1/3	30	ND/7.8	SM. Gray silty fine SAND, moist.		#00N (Ricci Bros.) Sand: 20.5'-10'
-15		14-16	1/4/4/6	60	ND/ND	SM. Gray silty medium to coarse SAND, trace fine gravel, wet.		
		16-18	3/6/4/2	40	ND/ND	SW. Gray fine to coarse SAND, trace gravel, wet.		10 slot, 2" Sch. 40 PVC Screen: 20'-12'
		18-20	3/2/3/3	40	ND/ND	SW. Gray fine to coarse SAND, trace silt and peat seams.		
-20		20-22	2/2/3/3	60	ND/ND	SM. Gray silty fine SAND, trace wood, trace coarse gravel.		
		22-26	NA	80	ND/ND	SM. Gray silty fine SAND, trace clay, siltier from 24-26'.		Bentonite Hole Plug: 26'-20'
-25								



COMMENTS: Boring was advanced with a BK-81 HD Rig.

Rig had only 20' of 6 1/4" HSAs available, sampled ahead in attempt to find next silty zone.

Collected soil sample MW-02D-6-8 for analysis of TCL VOCs.

BORING NO. : **NM-MW-02D**

URS Corporation

TEST BORING LOG

BORING NO. : NM-MW-02D

PROJECT: NYSDEC - 315 North Meadow Street

SHEET: 2 OF 2

CLIENT: NYSDEC

JOB NO. : 11175058.00000

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
						End of boring at 26'. Augered to 20', sampled to 26'.		

-30

-35

-40

-45

-50

-55

COMMENTS: Boring was advanced with a BK-81 HD Rig.

Rig had only 20' of 6 1/4" HSAs available, sampled ahead in attempt to find next silty zone.

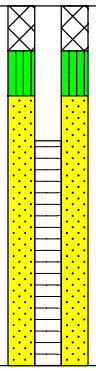
Collected soil sample MW-02D-6-8 for analysis of TCL VOCs.

URS Corporation

TEST BORING LOG

BORING NO. :	**NM-MW-02S**
PROJECT/PROJECT LOCATION:	**NYSDEC - 315 North Meadow Street**
SHEET:	**1 OF 1**
CLIENT:	**NYSDEC**
JOB NO. :	11175058.00000
BORING CONTRACTOR:	**Nothnagle Drilling**
NORTHING:	889728.8002 **EASTING:** 840453.0144
GROUNDWATER:	**GROUND ELEVATION:** 386.97
DATE STARTED:	8/28/07
DATE FINISHED:	8/28/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Brown

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	HSA	Split Spoon		
				DIA.	4 1/4"	2"		
				WT.		140 lbs.		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-4	NA	NA	NA	No Samples (0-4'), see boring log from NM-MW-02D.		8" Flushmount Casing Bentonite: 2'-1' 2" Sch. 40 PVC Riser: 3'-0'
-5		4-6	2/2/3/3	75	3.8	ML. Brown CLAYEY SILT, moist. SC. Gray CLAYEY fine SAND, moist to very moist. Strong petroleum odor.		#00N (Ricci Bros.) Sand: 8'-2'
		6-8	2/2/2/2	70	3.8	CL. SILTY CLAY, very plastic, moist.		10 slot, 2" Sch. 40 PVC Screen: 8'-3'
-10						End of boring at 8'.		
-15								
-20								
-25								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

Sampled 4-8 feet to determine if there were any water producing stringers present.

BORING NO. : NM-MW-02S

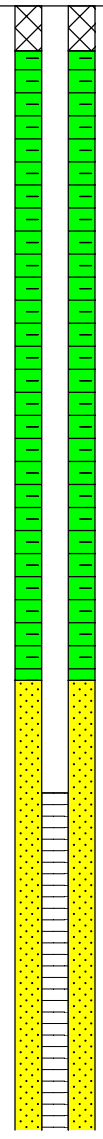
URS Corporation

TEST BORING LOG

BORING NO. :	NM-MW-03D
PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
SHEET:	1 OF 2
CLIENT:	NYSDEC
JOB NO. :	11175058.00000
BORING CONTRACTOR:	Nothnagle Drilling
NORTHING:	889691.9366 **EASTING:** 840372.6909
GROUNDWATER:	
GROUND ELEVATION:	386.63
DATE STARTED:	8/28/07
DATE FINISHED:	8/28/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Brown

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	HSA	Split Spoon		
				DIA.	4 1/4"	2"		
				WT.		140 lbs.		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-2	NA/4/2/2	75	ND/ND	Asphalt FILL. Dark gray clayey silt, some wood, gravel, coal, moist.		8" Flushmount Casing
		2-4	2/1/2/2	50	ND/ND	FILL. Dark gray clayey silt and gravel, some cinder, moist. ML. Brown SILTY CLAY, trace fine sand, moist.		
-5		4-6	2/2/3/2	50	ND/ND	-some fine sand 4.5-4.6', very moist. SM. Brown silty medium to coarse SAND, grading to fine to medium sand. Wet.		2" Sch. 40 PVC Riser: 17.5'-0'
		6-8	2/3/2/2	75	ND/ND	CL. Gray SILTY CLAY, moist. -siltier 8-8.5' and very moist		Bentonite: 15'-1'
		8-10	1/2/1/2	100	ND/ND	-8.5-10, plastic SILTY CLAY.		
-10		10-12	1/woh/1/2	100	ND/ND	SM. Gray very silty fine SAND, very moist. ML. Gray SILTY CLAY, plastic, grades to CLAYEY SILT, very moist.		
		12-14	woh/woh/ woh/woh	100	ND/ND			
-15		14-16	woh/woh/ woh/woh	100	ND/ND	-Peat parting at 14'. -trace peat throughout		
		16-18	woh/3/2/2	100	ND/ND			
		18-20	woh/1/1/2	100	ND/ND	-Some peat (17'-19') SM. Gray SILTY fine SAND, trace peat and organic material (roots). Wet at 19.5'.		
-20		20-22	woh/1/1/2	75	ND/ND			#00N (Ricci Bros.) Sand: 27.5'-15'
		22-24	woh/1/1/2	80	ND/ND			10 slot, 2" Sch. 40 PVC Screen: 27.5'-17.5'
-25								



COMMENTS: Boring was advanced with a BK-81 HD Rig.

Collected soil sample NM-MW-03D-4-6 for analysis of TCL VOCs.

BORING NO. : NM-MW-03D

URS Corporation

TEST BORING LOG

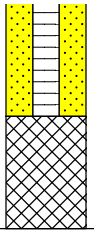
BORING NO. : NM-MW-03D

PROJECT: NYSDEC - 315 North Meadow Street

SHEET: 2 OF 2

CLIENT: NYSDEC

JOB NO. : 11175058.00000

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
		24-26	2/2/2/2	90	ND/ND			
		26-28	woh/woh/ woh/1	90	ND/ND	SM-SC. SILTY to CLAYEY fine SAND, wet. more clayey from 27.5-28' less fine sand from 27-28'		
		28-30	woh/woh/2/1	90	ND/ND	ML. CLAYEY SILT, trace fine gravel, wet.		Borehole collapse
-30						End of boring at 30'.		
-35								
-40								
-45								
-50								
-55								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

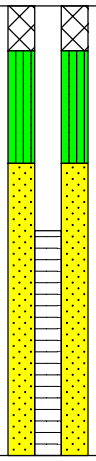
Collected soil sample NM-MW-03D-4-6 for analysis of TCL VOCs.

URS Corporation

TEST BORING LOG

BORING NO. :	**NM-MW-03S**
PROJECT/PROJECT LOCATION:	**NYSDEC - 315 North Meadow Street**
SHEET:	**1 OF 1**
CLIENT:	**NYSDEC**
JOB NO. :	11175058.00000
BORING CONTRACTOR:	**Nothnagle Drilling**
NORTHING:	889699.1361 **EASTING:** 840372.0667
GROUNDWATER:	
GROUND ELEVATION:	386.61
DATE STARTED:	8/28/07
DATE FINISHED:	8/28/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Brown

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	HSA			
				DIA.	4 1/4"			
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0						No samples collected, see boring log from NM-MW-03D.		8" Flushmount Casing Bentonite: 3.5'-1' 2" Sch. 40 PVC Riser: 5'-0' #00N (Ricci Bros.) Sand: 10'-3.5' 10 slot, 2" Sch. 40 PVC Screen: 10'-5'
-5								
-10						End of boring at 10'.		
-15								
-20								
-25								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

Boring was not sampled. See adjacent boring NM-MW-03D for lithologic information.

BORING NO. : NM-MW-03S

URS Corporation

TEST BORING LOG

BORING NO. : NM-MW-04S

PROJECT/PROJECT LOCATION: NYSDEC - 315 North Meadow Street

SHEET: 1 **OF** 1

CLIENT: NYSDEC

JOB NO. : 11175058.00000

BORING CONTRACTOR: Nothnagle Drilling

NORTHING: 889811.9708 **EASTING:** 840445.3758

GROUNDWATER:

GROUND ELEVATION: 386.48

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	HSA	Split Spoon		
				DIA.	4 1/4"	2"		
				WT.		140 lbs.		
				FALL		30"		
				* POCKET PENETROMETER READING				

DATE STARTED: 8/29/07

DATE FINISHED: 8/29/07

DRILLER: Kevin Busch

GEOLOGIST: R. Murphy

REVIEWED BY: Tim Brown

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-2	7/6/3/3	50	ND/ND	Asphalt and Gravel subbase. FILL. Gray silt, fine to coarse sand and gravel, some coal, ash, and cinder, damp.		8" Flushmount Casing
		2-4	1/1/2/3	75	ND/ND	ML. Brown CLAYEY SILT, low plasticity, moist. -some fine sand and very moist 2.5-2.6'		Bentonite: 7'-1'
-5		4-6	1/2/2/2	100	9.5/147	-becomes gray brown at 4'. -some fine sand and very moist 5.4-5.5', strong petroleum odor.		2" Sch. 40 PVC Riser: 9'-0'
		6-8	2/2/2/2	100	7.6/150	-become gray at 6', moderate petroleum odor 6-8'		#00N (Ricci Bros.) Sand: 14'-7'
-10		8-10	woh/woh/ woh/2	100	4.3/18.7	CL. Gray SILTY CLAY, moist. Petroleum odor terminates at 9'; no odor from 9-11'.		
		10-12	woh/woh/ woh/2	80	ND/0.8	SM. Gray very silty fine SAND, some clay, slightly wet, slight petroleum odor.		10 slot, 2" Sch. 40 PVC Screen: 14'-9'
		12-14	woh/1/2/3	75	ND/6.1	SM. Gray silty fine SAND, wet. Wood at 13'. SM. Gray silty medium to coarse SAND, wet, slight petroleum odor.		
-15						End of boring at 14'.		
-20								
-25								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

Collected soil sample NM-MW-04S-4-6' (plus FD-082907) and submitted for laboratory analysis of VOCs.

BORING NO. : NM-MW-04S

URS Corporation

TEST BORING LOG

BORING NO. :	NM-MW-05S
PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
SHEET:	1 OF 1
CLIENT:	NYSDEC
JOB NO. :	11175058.00000
BORING CONTRACTOR:	Nothnagle Drilling
NORTHING:	889682.8260 **EASTING:** 840508.4864
GROUNDWATER:	
GROUND ELEVATION:	387.41
DATE STARTED:	8/29/07
DATE FINISHED:	8/29/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Brown

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.	4 1/4"	2"		
				WT.		140 lbs.		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-2	15/10/6/3	60	7/12.9	Gravel FILL. Gray brown silt and sands, cinders, ash, dry to damp.		8" Flushmount Casing Bentonite: 4.1'-1'
		2-4	2/1/3/3	50	1/24.9	FILL. Gray brown clayey silt, some cinders and coal fragments, moist to damp. ML. Gray brown CLAYEY SILT, moist to damp.		2" Sch. 40 PVC Riser: 6'-0'
-5		4-6	3/3/3/3	50	4/4.3	CL. Brown SILTY CLAY, moist. -trace fine sand and very moist from 5.5-6.5'		#00N (Ricci Bros.) Sand: 11'-4.1'
		6-8	2/1/2/2	85	ND/8.8	-becomes gray 7.5-9.5'		
		8-10	2/1/1/2	80	ND/24.6	SM. Brown silty medium to coarse SAND, wet.		10 slot, 2" Sch. 40 PVC Screen: 11'-6'
-10		10-12	woh/woh/ woh/1	10	ND/ND	CL. Gray SILTY CLAY, trace coarse gravel and medium sand, moist.		
						End of boring at 12'. Augered to 11', sampled to 12',		
-15								
-20								
-25								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

BORING NO. : NM-MW-05S

URS Corporation

TEST BORING LOG

BORING NO. :	NM-MW-06S
PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
SHEET:	1 OF 1
CLIENT:	NYSDEC
JOB NO. :	11175058.00000
BORING CONTRACTOR:	Nothnagle Drilling
NORTHING:	889646.0494 **EASTING:** 840443.4968
GROUNDWATER:	
GROUND ELEVATION:	386.74
DATE STARTED:	8/30/07
DATE FINISHED:	8/30/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Brincin

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	HSA	Split Spoon		
				DIA.	4 1/4"	2"		
				WT.		140 lbs.		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-2	NA/1/3/5	90	ND/ND	Concrete FILL. Brown to dark gray silt, some fine to coarse sand, trace fine gravel, some cinder, ash, and brick, moist.		8" Flushmount Casing Bentonite: 3.5'-1'
		2-4	2/2/2/4	80	ND/ND	FILL. Reworked brown silty clay, some cinder, moist. CL. Gray brown to brown SILTY CLAY, moist.		2" Sch. 40 PVC Riser: 5'-0'
-5		4-6	2/2/2/2	90	ND/ND	SM. Gray silty fine SAND, wet. CL. Gray to gray brown SILTY CLAY, moist. -slight petroleum odor from 5.3-6.0'. -very moist to wet, siltier zones from 6.5-6.6' and 7.1-7.2'		#00N (Ricci Bros.) Sand: 10'-3.5'
		6-8	2/3/2/2	100	ND/ND	-very moist 8-9'.		10 slot, 2" Sch. 40 PVC Screen: 10'-5'
		8-10	1/woh/ woh/1	100	ND/ND	ML. Gray CLAYEY SILT, trace fine sand, very moist to wet.		
-10						End of boring at 10'.		
-15								
-20								
-25								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

Collected soil sample NM-MW-06S-4-5' plus MS/MSD and submitted for laboratory analysis of TCL VOCs.

BORING NO. : NM-MW-06S

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
CLIENT:	NYSDEC
BORING CONTRACTOR:	Nothnagle Drilling
GROUNDWATER:	

	CAS.	SAMPLER	CORE	TUBE
TYPE	HSA	Split Spoon		
DIA.	4 1/4"	2"		
WT.		140 lbs.		
FALL		30"		

DATE	TIME	LEVEL	TYPE

* POCKET PENETROMETER READING

BORING NO. :	NM-MW-07S
SHEET:	1 OF 1
JOB NO. :	11175058.00000
NORTHING:	889506.9239 EASTING: 840449.8701
GROUND ELEVATION:	387.23
DATE STARTED:	8/30/07
DATE FINISHED:	8/30/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Bruein

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0						Concrete		8" Flushmount Casing
		0-2	NA/5/5/6	90	ND/ND	FILL. Light brown silty fine to coarse sand and gravel.		Bentonite: 3.5'-1'
						FILL. Dark gray to black silt, cinders, ash, slag, and gravel.		
		2-4	4/2/2/3	40	ND/ND	ML. Light brown CLAYEY SILT, moist.		2" Sch. 40 PVC Riser: 5'-0'
-5		4-6	2/3/3/4	80	ND/ND	CL. Brown SILTY CLAY, moist.		#00N (Ricci Bros.) Sand: 10'-3.5'
						- trace fine sand and siltier zone at 6-6.2', very moist		
		6-8	4/3/3/3	80	ND/ND	ML. Brown CLAYEY SILT, trace fine sand, very moist.		
						CL. Brown SILTY CLAY, moist. Very silty from 8-9'.		10 slot, 2" Sch. 40 PVC Screen: 10'-5'
		8-10	woh/2/ woh/2	100	ND/ND	SM. Gray silty fine to medium SAND, wet.		
-10						CL. Gray SILTY CLAY, moist.		
						End of boring at 10'.		
-15								
-20								
-25								

COMMENTS: Boring was advanced with a BK-81 HD Rig.

Collected soil sample NM-MW-07S-4-6' and submitted for laboratory analysis of TCL VOCs.

BORING NO. : **NM-MW-07S**

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
CLIENT:	NYSDEC
BORING CONTRACTOR:	Nothnagle Drilling
GROUNDWATER:	

DATE	TIME	LEVEL	TYPE

	CAS.	SAMPLER	CORE	TUBE
TYPE	HSA	Split Spoon		
DIA.	4 1/4"	2"		
WT.		140 lbs.		
FALL		30"		

* POCKET PENETROMETER READING

BORING NO. :	NM-MW-08S
SHEET:	1 OF 1
JOB NO. :	11175058.00000
NORTHING:	889898.3193 EASTING: 840386.1788
GROUND ELEVATION:	385.77
DATE STARTED:	9/6/07
DATE FINISHED:	9/6/07
DRILLER:	Kevin Busch
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Bruein

DEPTH FEET	STRATA	SAMPLE DEPTH	SAMPLE BLOW COUNTS	RECOVERY (%)	PID DIRECT/ HEAD-SPACE	MATERIAL DESCRIPTION	WELL CONSTRUCTION	REMARKS
0		0-2	NA/NA/ 9/10	90	ND/ND	Asphalt Concrete FILL. Brown fine to coarse sand and gravel, damp to wet.		8" Flushmount Casing Bentonite: 3.5'-1'
		2-4	4/6/3/4	20	ND/ND	ML. Gray to black CLAYEY SILT, damp with decay odor.		2" Sch. 40 PVC Riser: 5'-0'
-5		4-6	3/2/2/2	100	ND/ND	CL. Gray SILTY CLAY, moist. ML. Gray CLAYEY SILT, some fine sand, wet.		#00N (Ricci Bros.) Sand: 10'-3.5'
		6-8	1/2/1/1	100	ND/ND	CL. Gray brown SILTY CLAY, moist -very moist siltier zone at 7.5'		10 slot, 2" Sch. 40 PVC Screen: 10'-5'
		8-10	1/1/1/1	75	ND/ND	ML. Gray SILT, some clay, some fine sand, wet.		
-10						CL. Gray SILTY CLAY, moist. End of boring at 10'.		
-15								
-20								
-25								

COMMENTS: Boring was advanced with a Gus Pech Mite-E-Mite Low Profile drill rig.

Collected soil sample NM-MW-08S-4-5' and submitted for laboratory analysis of TCL VOCs.

BORING NO. : **NM-MW-08S**

DRILLING SUMMARY

Geologist: John Boyd

Drilling Company: Geologic, NY

Driller: Steve Laramee

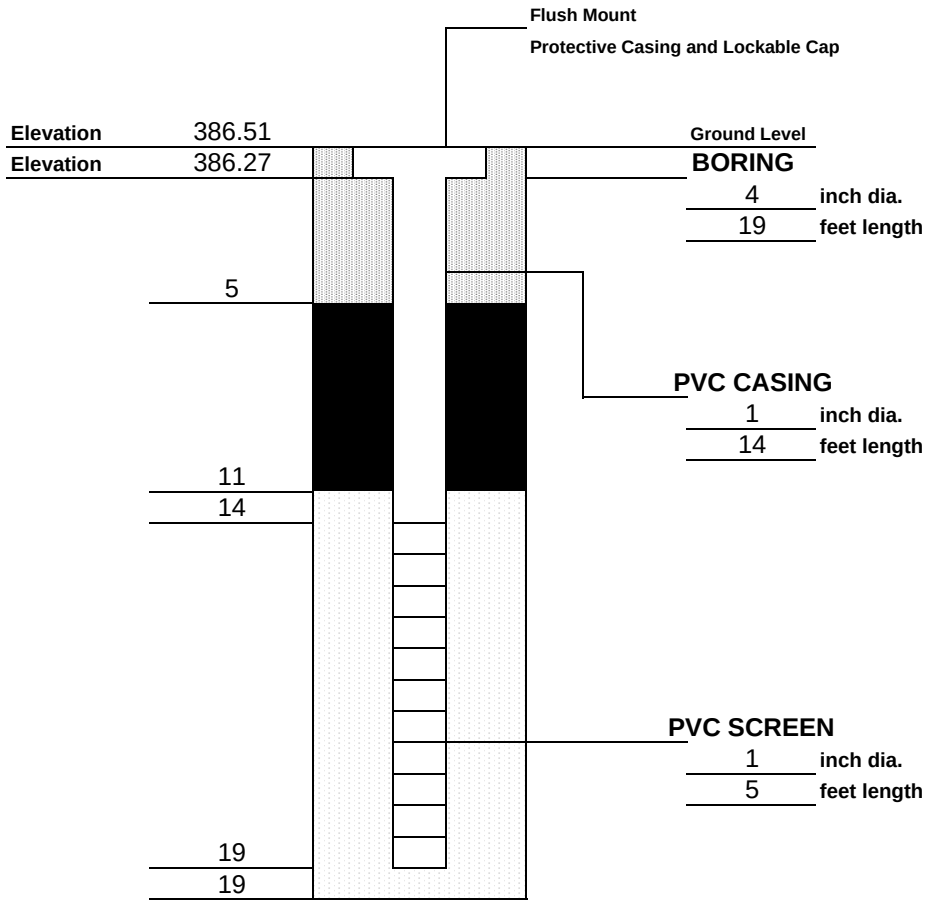
Rig Make/Model: Geoprobe 6620 DT

Date: 2/9/2009

GEOLOGIC LOG

Depth(ft.)	Description
	See geologic log for NM-MW-04S (9' - 14") and NM-MW-02D (12' - 20').

DEPTH



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: 4-inch diameter aluminum grade box cemented in place	**Type:** 1" ID, 2" OD PVC prepacked screen	**Type:** #2 Sand **Setting:** 11 - 19' bgs
Monitor: 1" ID PVC	**Slot Size:** .010"	***SEAL MATERIAL*** **Type:** Bentonite (granular bentonite) **Setting:** 5 - 11' bgs

COMMENTS:

Well constructed adjacent to monitoring well NM-MW-04S (9' - 14').

LEGEND

- Cuttings/bentonite/cement
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	**Location: 315 N. Meadow, Ithaca, NY**	**Project No.:11175769.00000**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: NM-MW-04D**

DRILLING SUMMARY

Geologist: John Boyd

Drilling Company: Geologic, NY

Driller: Steve Laramee

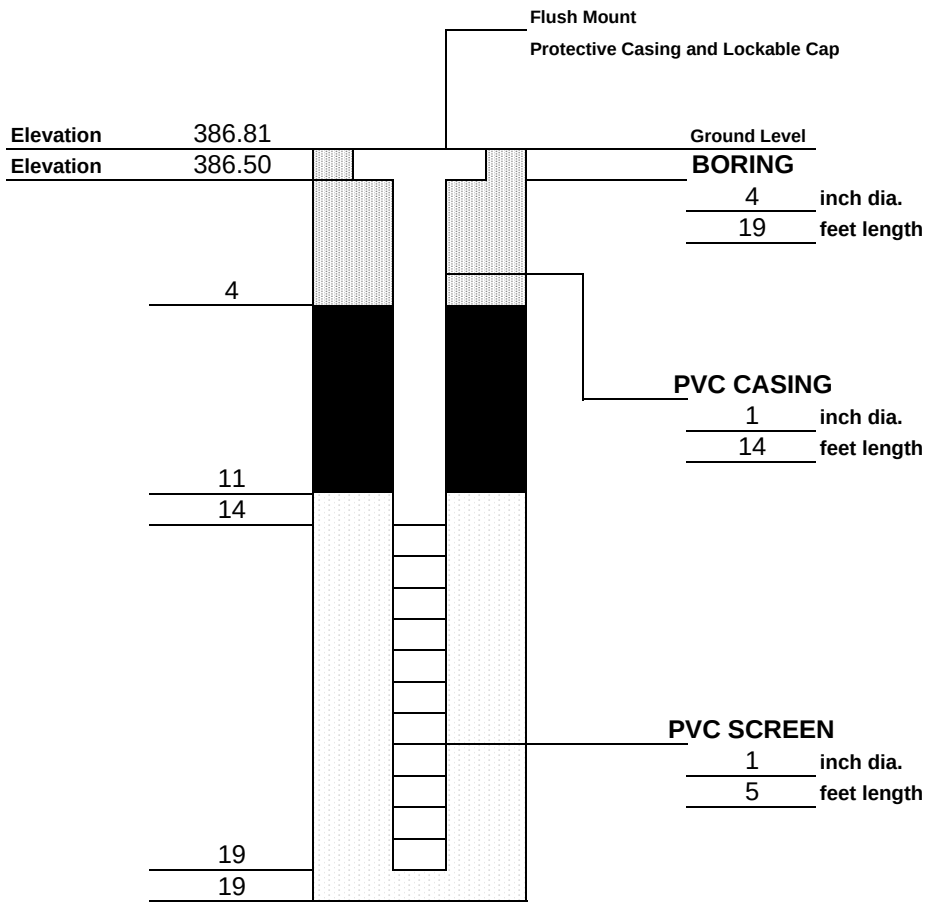
Rig Make/Model: Geoprobe 6620 DT

Date: 2/9/2009

GEOLOGIC LOG

Depth(ft.)	Description
	See geologic log for NM-GS 09 (15' - 19').

DEPTH



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: 4-inch diameter aluminum grade box cemented in place	**Type:** 1" ID, 2" OD PVC prepacked screen	**Type:** #2 Sand **Setting:** 11 - 19' bgs
Monitor: 1" ID PVC	**Slot Size:** .010"	***SEAL MATERIAL*** **Type:** Bentonite (granular bentonite) **Setting:** 4 - 11' bgs

COMMENTS:

Well constructed adjacent to Geoprobe groundwater sampling location NM-GS-09 (15' - 19'). 8/07

LEGEND

- Cuttings/bentonite/cement
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	**Location: 315 N. Meadow, Ithaca, NY**	**Project No.:11175769.00000**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: NM-MW-09D**

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	NYSDEC - 315 North Meadow Street
CLIENT:	NYSDEC
BORING CONTRACTOR:	Geologic NY, Inc.
BORING NO. :	GS-08-09
SHEET:	1 OF 3
JOB NO. :	11175061.00000
NORTHING:	Not Surveyed
EASTING:	Not Surveyed
GROUND ELEVATION:	Not Surveyed
DATE STARTED:	11/24/08
DATE FINISHED:	11/24/08
DRILLER:	Chris Gabriel
GEOLOGIST:	R. Murphy
REVIEWED BY:	Tim Brunein

GROUNDWATER:

DATE	TIME	LEVEL	TYPE

	CAS.	SAMPLER	CORE	TUBE
TYPE		Macrocore		
DIA.		2"		
WT.				
FALL				

* POCKET PENETROMETER READING

DEPTH FEET	STRATA	SAMPLE DEPTH	RECOVERY (%)	PID DIRECT	PID HEAD-SPACE	MATERIAL DESCRIPTION	REMARKS
0		0-4	100	ND	NA	ASPHALT and gravel subbase FILL. Brown silty clay, some gravel, brick, moist.	
-5		4-8	100	ND		CL. Brown gray SILTY CLAY, stiff, moist. CL. Gray SILTY CLAY, moist. -siltier/moister from 6-7' -slight petroleum odor at 8'	
-10		8-12	100	ND		CL. Gray SILTY CLAY, moist. -silty fine sand stringer at 11'	
-15		12-16	90	5.9		SM. Gray SILTY fine SAND, moist, slight petroleum odor. -trace peat and wet at 12' SM. Gray SILTY coarse SAND to fine gravel, wet.	
-20		16-20	50	3.8		SM. Brown SILTY fine SAND with PEAT, wet. SM. Gray SILTY coarse SAND to fine gravel, wet.	
-25		20-24	50	0.3		SM. Gray SILTY fine to coarse SAND some fine gravel, wet. SM. Gray SILTY fine SAND, wet. SM. Brown gray very SILTY fine SAND, trace wood, wet.	

COMMENTS: Boring was advanced with a track mounted Geoprobe unit.

Collected groundwater samples GS-08-09-16-20, GS-08-09-24-28, and GS-08-09-28-32 and submitted for analysis of TCL VOCs.

Collected soil sample GS-08-09-28-32 for grain size and Atterberg analyses.

URS Corporation

TEST BORING LOG

BORING NO. : GS-08-09

PROJECT/PROJECT LOCATION: NYSDEC - 315 North Meadow Street

SHEET: 2 **OF** 3

CLIENT: NYSDEC

JOB NO. : 11175061.00000

BORING CONTRACTOR: Geologic NY, Inc.

NORTHING: Not Surveyed **EASTING:** Not Surveyed

GROUNDWATER:

GROUND ELEVATION: Not Surveyed

DATE	TIME	LEVEL	TYPE	CAS.	SAMPLER	CORE	TUBE
			TYPE		Macrocore		
			DIA.		2"		
			WT.				
			FALL				
			* POCKET PENETROMETER READING				

DATE STARTED: 11/24/08

DATE FINISHED: 11/24/08

DRILLER: Chris Gabriel

GEOLOGIST: R. Murphy

REVIEWED BY: Tim Brown

DEPTH FEET	STRATA	SAMPLE DEPTH	RECOVERY (%)	PID DIRECT	PID HEAD-SPACE	MATERIAL DESCRIPTION	REMARKS
-25		24-28	40	ND			
		28-32	60	ND		ML. Brown gray SILT, some clay, trace thin very fine sand stringers, wet.	
-30						End of boring at 32'.	
-35							
-40							
-45							
-50							

COMMENTS: Boring was advanced with a track mounted Geoprobe unit.

Collected groundwater samples GS-08-09-16-20, GS-08-09-24-28, and GS-08-09-28-32 and submitted for analysis of TCL VOCs.

Collected soil sample GS-08-09-28-32 for grain size and Atterberg analyses.

URS Corporation

TEST BORING LOG

BORING NO. : GS-08-09

PROJECT/PROJECT LOCATION: NYSDEC - 315 North Meadow Street

SHEET: 3 **OF** 3

CLIENT: NYSDEC

JOB NO. : 11175061.00000

BORING CONTRACTOR: Geologic NY, Inc.

NORTHING: Not Surveyed **EASTING:** Not Surveyed

GROUNDWATER:

GROUND ELEVATION: Not Surveyed

DATE	TIME	LEVEL	TYPE	CAS.	SAMPLER	CORE	TUBE
			TYPE		Macrocore		
			DIA.		2"		
			WT.				
			FALL				
			* POCKET PENETROMETER READING				

DATE STARTED: 11/24/08

DATE FINISHED: 11/24/08

DRILLER: Chris Gabriel

GEOLOGIST: R. Murphy

REVIEWED BY: Tim Brunein

DEPTH FEET	STRATA	SAMPLE DEPTH	RECOVERY (%)	PID DIRECT	PID HEAD-SPACE	MATERIAL DESCRIPTION	REMARKS
-50							
-55							

COMMENTS: Boring was advanced with a track mounted Geoprobe unit.

Collected groundwater samples GS-08-09-16-20, GS-08-09-24-28, and GS-08-09-28-32 and submitted for analysis of TCL VOCs.

Collected soil sample GS-08-09-28-32 for grain size and Atterberg analyses.

DRILLING SUMMARY

Geologist: John Boyd

Drilling Company: Geologic, NY

Driller: Steve Laramee

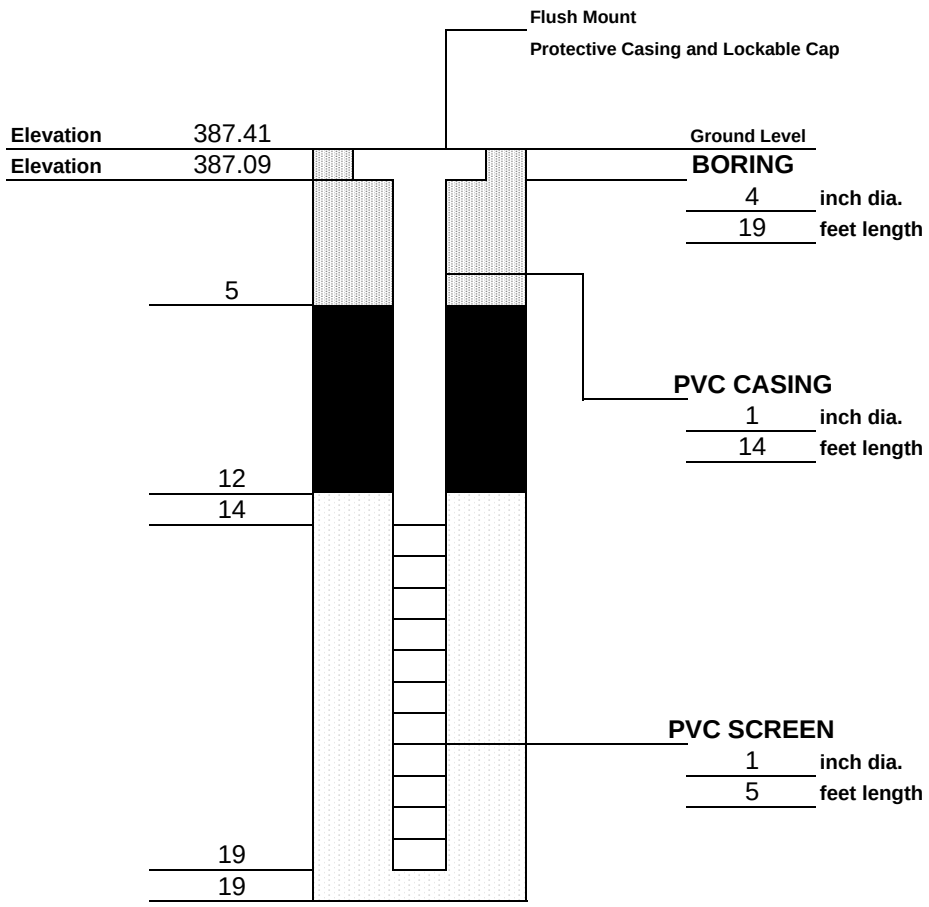
Rig Make/Model: Geoprobe 6620 DT

Date: 2/10/2009

GEOLOGIC LOG

Depth(ft.)	Description
	See geologic log for NM-MW-02D (12' - 20').

DEPTH



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: 4-inch diameter aluminum grade box cemented in place	**Type:** 1" ID, 2" OD PVC prepacked screen	**Type:** #2 Sand **Setting:** 12 - 19' bgs
Monitor: 1" ID PVC	**Slot Size:** .010"	***SEAL MATERIAL*** **Type:** Bentonite (granular bentonite) **Setting:** 5 - 12' bgs

COMMENTS:

LEGEND

- Cuttings/bentonite/cement
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	**Location: 315 N. Meadow, Ithaca, NY**	**Project No.:11175769.00000**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: NM-MW-10D**

DRILLING SUMMARY

Geologist: John Boyd

Drilling Company: Geologic, NY

Driller: Steve Laramee

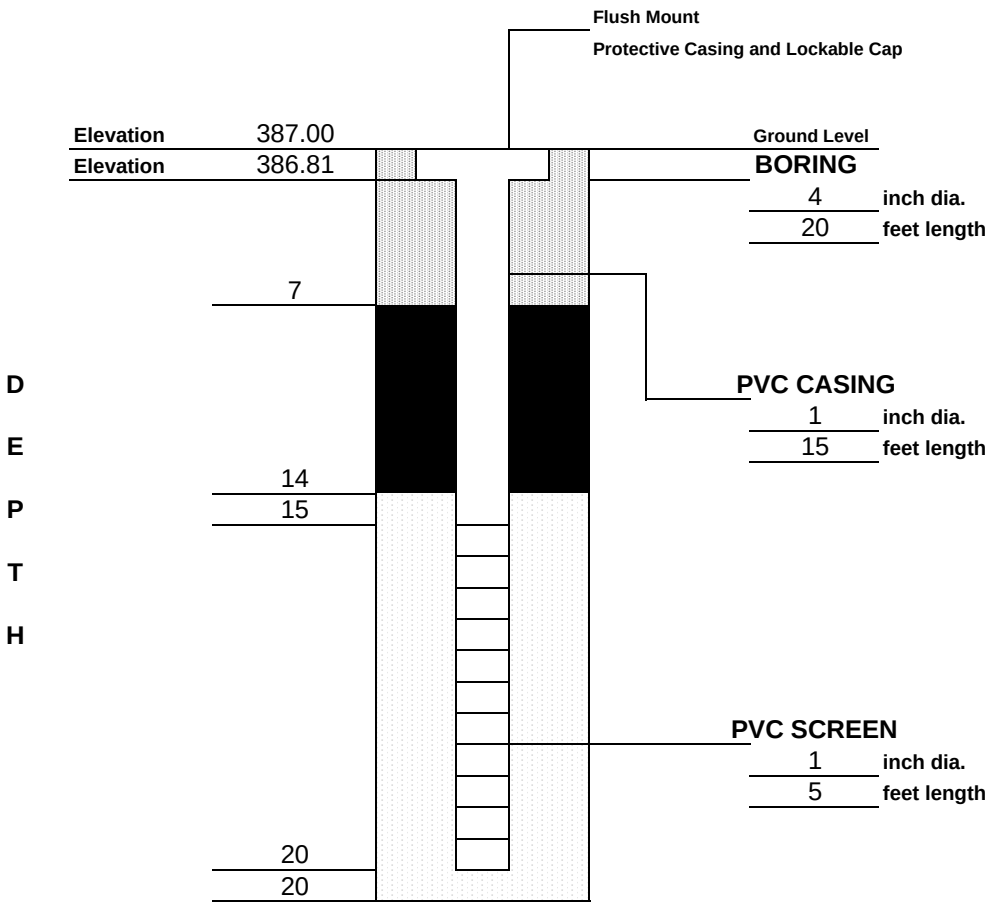
Rig Make/Model: Geoprobe 6620 DT

Date: 2/10/2009

GEOLOGIC LOG

Depth(ft.)	Description
	See geologic log for NM-MW-02D (12' - 20').

WELL DESIGN



CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: 4-inch diameter aluminum grade box cemented in place	**Type:** 1" ID, 2" OD PVC prepacked screen	**Type:** #2 Sand **Setting:** 14 - 20' bgs
Monitor: 1" ID PVC	**Slot Size:** .010"	***SEAL MATERIAL*** **Type:** Bentonite (granular bentonite) **Setting:** 7 - 14' bgs

COMMENTS:

LEGEND

- Cuttings/bentonite/cement
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	**Location: 315 N. Meadow, Ithaca, NY**	**Project No.:11175769.00000**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: NM-MW-11D**

DRILLING SUMMARY

Geologist:
John Boyd

Drilling Company:
Geologic, NY

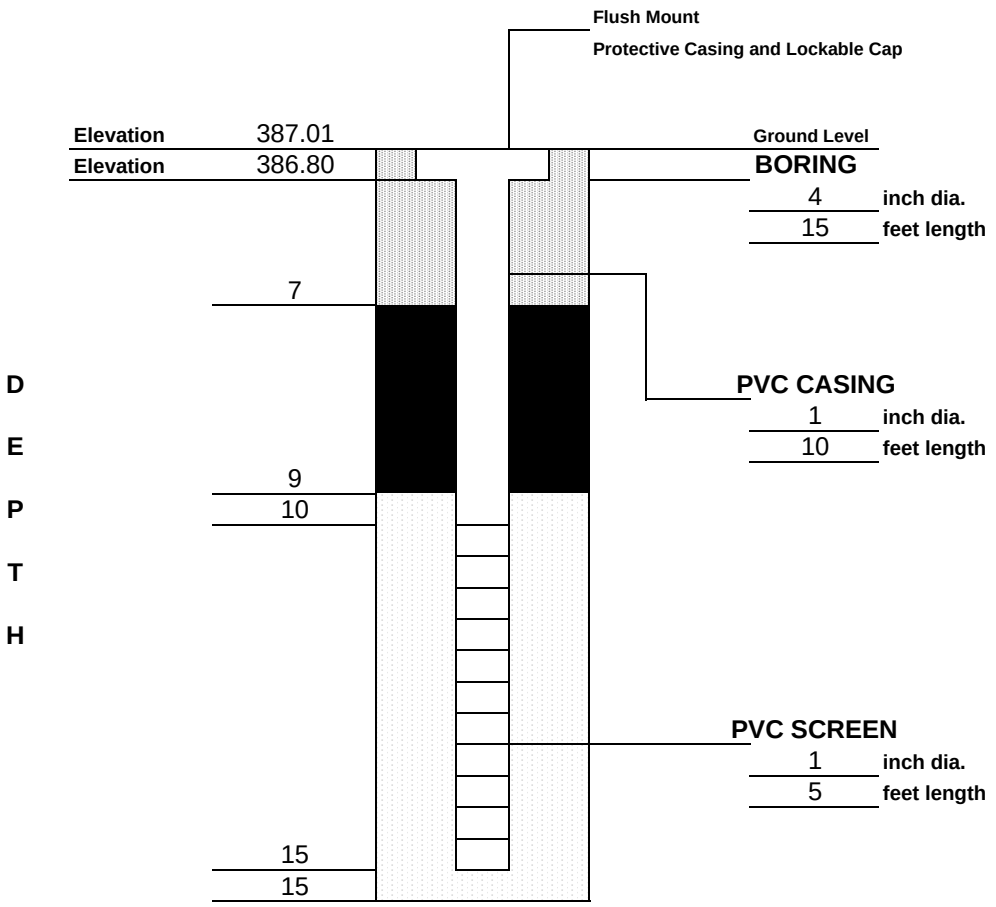
Driller:
Steve Laramee

Rig Make/Model:
Geoprobe 6620 DT

Date:
2/10/2009

GEOLOGIC LOG

Depth(ft.)	Description
	See geologic log for NM-MW-02D (12' - 20').



D
E
P
T
H

WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: 4-inch diameter aluminum grade box cemented in place	**Type:** 1" ID, 2" OD PVC prepacked screen	**Type:** #2 Sand **Setting:** 9 - 15' bgs
Monitor: 1" ID PVC	**Slot Size:** .010"	***SEAL MATERIAL*** **Type:** Bentonite (bentonite chips) **Setting:** 7 - 9' bgs

COMMENTS:

LEGEND

- Cuttings/bentonite/cement
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	**Location: 315 N. Meadow, Ithaca, NY**	**Project No.:11175769.00000**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: NM-MW-11S**

DRILLING SUMMARY

Geologist: John Boyd

Drilling Company: Geologic, NY

Driller: Steve Laramee

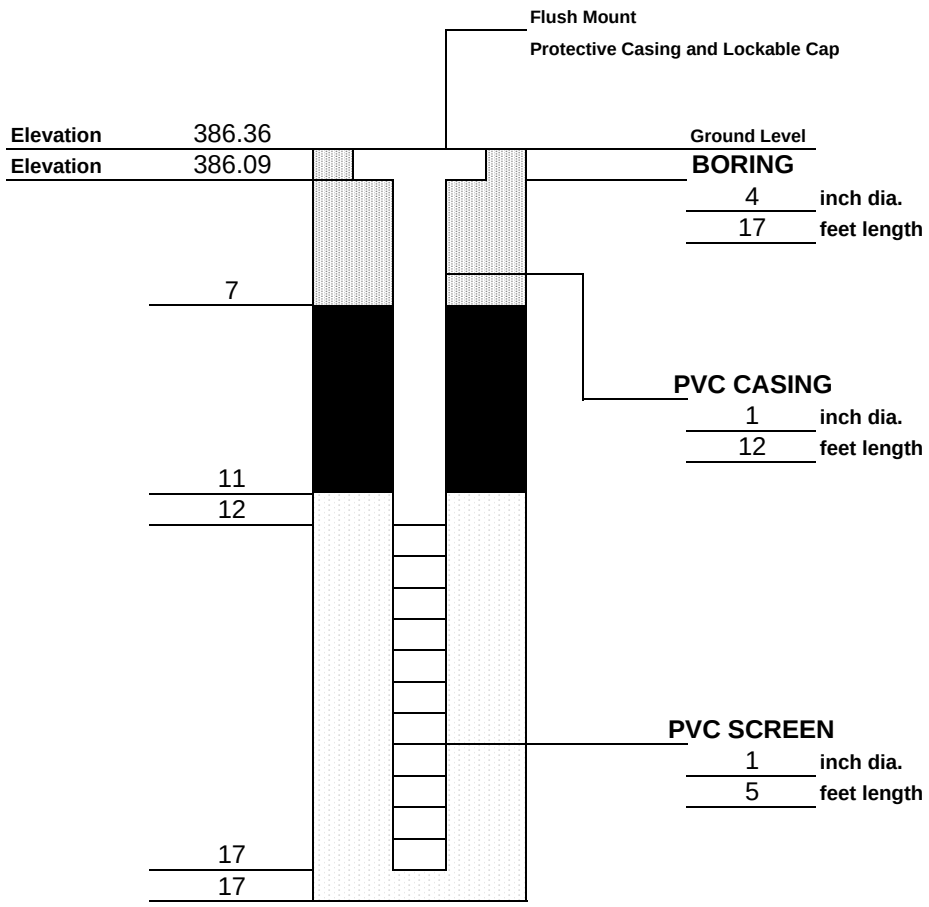
Rig Make/Model: Geoprobe 6620 DT

Date: 2/11/2009

GEOLOGIC LOG

Depth(ft.)	Description
	See geologic log for NM-GS 04 (12' - 16').

DEPTH



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: 4-inch diameter aluminum grade box cemented in place	**Type:** 1" ID, 2" OD PVC prepacked screen	**Type:** #2 Sand **Setting:** 11 - 17' bgs
Monitor: 1" ID PVC	**Slot Size:** .010"	***SEAL MATERIAL*** **Type:** Bentonite (bentonite chips) **Setting:** 7 - 11' bgs

COMMENTS:

LEGEND

- Cuttings/bentonite/cement
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	**Location: 315 N. Meadow, Ithaca, NY**	**Project No.:11175769.00000**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: NM-MW-12D**

URS Corporation

TEST BORING LOG

BORING NO. : GS-08-04

PROJECT/PROJECT LOCATION: NYSDEC - 315 North Meadow Street

SHEET: 1 **OF** 3

CLIENT: NYSDEC

JOB NO. : 11175061.00000

BORING CONTRACTOR: Geologic NY, Inc.

NORTHING: Not Surveyed **EASTING:** Not Surveyed

GROUNDWATER:

GROUND ELEVATION: Not Surveyed

DATE	TIME	LEVEL	TYPE	CAS.	SAMPLER	CORE	TUBE
			TYPE		Macrocore		
			DIA.		2"		
			WT.				
			FALL				
			* POCKET PENETROMETER READING				

DATE STARTED: 11/19-20/08

DATE FINISHED: 11/19-20/08

DRILLER: Chris Gabriel

GEOLOGIST: R. Murphy

REVIEWED BY: Tim Brunein

DEPTH FEET	STRATA	SAMPLE DEPTH	RECOVERY (%)	PID DIRECT	PID HEAD-SPACE	MATERIAL DESCRIPTION	REMARKS
0		0-4	40	ND	NA	Asphalt and gravel subbase. FILL. Brown clayey silt and gravel, moist.	
-5		4-8	75	ND		CL. Gray Brown SILTY CLAY, moist.	
-10		8-12	60	ND		CL. Gray SILTY CLAY, moist. Becomes wet at 12'.	
-15		12-16	25	ND			
-20		16-20	40	ND		CL. Gray SILTY CLAY with PEAT interlayers, very moist. SM. Gray SILTY fine SAND, wet.	
-25		20-24	50	ND		ML. Brown Gray SILT, some clay, little very fine sand, trace organics (roots), low plasticity, wet.	

COMMENTS: Boring was advanced with a track mounted Geoprobe unit.

Collected groundwater samples GS-08-04-20-24, GS-08-04-24-28, and GS-08-04-28-32 and submitted for analysis of TCL VOCs.

URS Corporation

TEST BORING LOG

BORING NO. : GS-08-04

PROJECT/PROJECT LOCATION: NYSDEC - 315 North Meadow Street

SHEET: 2 **OF** 3

CLIENT: NYSDEC

JOB NO. : 11175061.00000

BORING CONTRACTOR: Geologic NY, Inc.

NORTHING: Not Surveyed **EASTING:** Not Surveyed

GROUNDWATER:

DATE	TIME	LEVEL	TYPE

	CAS.	SAMPLER	CORE	TUBE
TYPE		Macrocore		
DIA.		2"		
WT.				
FALL				

* POCKET PENETROMETER READING

GROUND ELEVATION: Not Surveyed

DATE STARTED: 11/19-20/08

DATE FINISHED: 11/19-20/08

DRILLER: Chris Gabriel

GEOLOGIST: R. Murphy

REVIEWED BY: Tim Brunein

DEPTH FEET	STRATA	SAMPLE DEPTH	RECOVERY (%)	PID DIRECT	PID HEAD-SPACE	MATERIAL DESCRIPTION	REMARKS
-25		24-28	90	ND			
						ML. Brown Gray SILT, some clay, with occasional silt interbeds, trace organics (roots), low to medium plasticity, wet.	
-30		28-32	70	ND			
						End of boring at 32'.	
-35							
-40							
-45							
-50							

COMMENTS: Boring was advanced with a track mounted Geoprobe unit.

Collected groundwater samples GS-08-04-20-24, GS-08-04-24-28, and GS-08-04-28-32 and submitted for analysis of TCL VOCs.

URS Corporation

TEST BORING LOG

BORING NO. : GS-08-04

PROJECT/PROJECT LOCATION: NYSDEC - 315 North Meadow Street

SHEET: 3 **OF** 3

CLIENT: NYSDEC

JOB NO. : 11175061.00000

BORING CONTRACTOR: Geologic NY, Inc.

NORTHING: Not Surveyed **EASTING:** Not Surveyed

GROUNDWATER:

GROUND ELEVATION: Not Surveyed

DATE	TIME	LEVEL	TYPE	CAS.	SAMPLER	CORE	TUBE
			TYPE		Macrocore		
			DIA.		2"		
			WT.				
			FALL				
			* POCKET PENETROMETER READING				

DATE STARTED: 11/19-20/08

DATE FINISHED: 11/19-20/08

DRILLER: Chris Gabriel

GEOLOGIST: R. Murphy

REVIEWED BY: Tim Brown

DEPTH FEET	STRATA	SAMPLE DEPTH	RECOVERY (%)	PID DIRECT	PID HEAD-SPACE	MATERIAL DESCRIPTION	REMARKS
-50							
-55							

COMMENTS: Boring was advanced with a track mounted Geoprobe unit.

Collected groundwater samples GS-08-04-20-24, GS-08-04-24-28, and GS-08-04-28-32 and submitted for analysis of TCL VOCs.

APPENDIX D – EXCAVATION WORK PLAN

D-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table D-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table D-1: Notifications

NYSDEC Project Manager: Michael Mason	518-402-9813 michael.mason@dec.ny.gov
NYSDEC Regional HW Engineer: Harry Warner	(315) 426-7551 harold.warner@dec.ny.gov
NYSDEC Site Control: Kelly Lewandowski	kelly.lewandowski@dec.ny.gov
NYSDOH: Mark Sergott	(518) 402-7860 mark.sergott@health.ny.gov

Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;

- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix E of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

D-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections D-6 and D-7 of this Appendix.

D-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

D-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

D-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks loaded with site materials will exit the vicinity of the site using approved truck routes taking into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

D-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a

formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

D-7 MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Soil proposed for reuse on the site must be in compliance with Table 5.4(e)4 of NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation. For this site, soils proposed for reuse will be sampled at the rate presented in table 5.4(e)10 of DER-10. Samples collected in accordance with this table will be analyzed for:

- VOCs by USEPA Method 8260
- SVOCs by USEPA Method 8270
- Pesticides/PCBs by USEPA Method 8081/8082
- 2,4,5-TP by USEPA Method 8150B
- Cyanide by USEPA Method 9012/9014

- Target Analyte List (TAL) Metals by USEPA Method 6010/7471 plus Hexavalent and Trivalent Chromium

To be eligible for reuse, the analytical results must be less than the Commercial Restricted Use Soil Cleanup Objectives in Table 375-6.8(b) of 6 NYCRR Part 375.

Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below a demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

D-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

D-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Record of Decision and SMP Figure 8. The

existing cover system is comprised of either the structures such as the onsite building, pavement, and concrete, or a minimum of 12 inches of soil and/or gravel which meets commercial use SCOs for cover material as set forth in 6 NYCRR Part 375-6.8(b). The demarcation layer, consisting of orange snow fencing material, will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil/gravel cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

D-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d) for commercial use. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

D-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

D-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

D-16 COMMUNITY AIR MONITORING PLAN

A Community Air Monitoring Plan (CAMP) will be implemented during excavation activities. *Continuous monitoring* will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. *Periodic monitoring* for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

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

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The

equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

APPENDIX E – HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

FOR THE
POST-REMEDIATION GROUNDWATER MONITORING
NYSDEC 315 N. MEADOW STREET SITE
SITE #7-55-014
ITHACA, TOMPKINS COUNTY, NEW YORK

Prepared For

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
WORK ASSIGNMENT D007622-05.1

Prepared By:

URS CORPORATION
257 WEST GENESEE STREET, SUITE 400
BUFFALO, NEW YORK
JOB NO. 11176702

DECEMBER 2015

HEALTH AND SAFETY PLAN

NYSDEC 315 N. MEADOW STREET SITE (#755014),

ITHACA, TOMKINS COUNTY, NEW YORK

		PHONE
URS Project Number:	11176702	
URS Project Manager:	Jon Sundquist	716-923-1207
URS Site Safety Officer:		
URS Plan Preparer:		
Preparation Date:	August 2015	
Expiration Date:		

APPROVALS

Health, Safety, and Environment Representative:

_____

Steve Moeller, CHMM (DATE)

Project Manager:

_____

Jon Sundquist, PhD. (DATE)

Regional HSE Manager:

_____

CIH (DATE)

This Health and Safety Plan is valid only for this specific project as described in Section 3.0. It is not to be used for other projects or subsequent phases of this project without the written approval of the Regional Health, Safety, and Environment Manager. A copy of this plan is to be maintained at the site at all times.

SAFETY PLAN COMPLIANCE AGREEMENT

I have read the Health and Safety Plan for the project and I understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the Plan

Name	**Signature**	**Date**
URS Site Safety Officer		
URS Site Personnel		
URS Site Personnel		
URS Site Personnel		
URS Site Personnel		

Subcontractors:

Company	**Signature**	**Date**

HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

°C	degrees centigrade
°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
analyzer	field instrument described in Section 6.1
BPs	blood-borne pathogens
ANSI	American National Standards Institute
C	ceiling
Carcinogen	a substance that can cause cancer
CGI	combustible gas indicator
CMS	chip monitoring system
CN	cyanide
CO	carbon monoxide
CRZ	contaminant reduction zone
dBA	decibel
DOT	Department of Transportation
ESLI	End-of-Service-Life Indicator
eV	electron volts
EZ	Exclusion Zone
FID	flame ionization detector
HCN	hydrogen cyanide
HEPA	high-efficiency particular absolute
HASP	Health and Safety Plan
H_2S	hydrogen sulfide
IFD	New York City Fire Department
LEL	lower explosive limit
m	meter
mg	milligram
mg/m^3	milligrams per cubic meter

GLOSSARY OF TERMS, ACRONYMS AND ABBREVIATIONS (Continued)

NIOSH	National Institute for Occupational Safety and Health
NO	nitric oxide
NO_2	nitrogen dioxide
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O_2	oxygen
OBZ	operator's breathing zone
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
OVM	organic vapor monitor
PEL	permissible exposure limit
PID	photoionization detector
PM	project manager
PPE	personal protective equipment
ppb	parts per billion
ppm	parts per million
REL	recommended exposure limit
RHSEM	Regional Health, Safety, and Environment Manager
SDS	Safety Data Sheet
SMS	Safety Management Standard
SSO	Site Safety Officer
STEL	short term exposure limit
TLV	Threshold Limit Value
TWA	time-weighted average
URS	URS Corporation and subsidiaries
VOC	volatile organic compound

1.0 PLAN-AT-A-GLANCE

HEALTH AND SAFETY PLAN SUMMARY SHEET

THIS SUMMARY SHEET IS PROVIDED AS A QUICK-REFERENCE/OVERVIEW ONLY. THE REMAINDER OF THIS SITE-SPECIFIC HEALTH AND SAFETY PLAN (HASP) IS INTEGRAL TO THE SAFE CONDUCT OF SITE OPERATIONS AND MUST BE APPLIED IN ITS ENTIRETY.

EMERGENCY INFORMATION

Ambulance:		**911**
Fire:		**911**
Police:		**911**
Hospital:	**Cayuga Medical Center**	**(607) 274-4011**

NYSDEC Project Manager:
Mike Mason **518-402-9814**

URS Project Manager:
Jon Sundquist **716-923-1207**

URS Health, Safety, and Environment Representative:
Steve Moeller **716-923-1112**

URS Regional Manager Health, Safety, and Environment:

URS Occupational Health Manager:
WorkCare **866-326-7321**

NYSDEC Spill Response
NYSDEC Spill Hotline: **(800) 457-7362**
National Response Center: **(800) 424-8802**

NYSDOH Project Contact **TBD**

HOSPITAL DIRECTIONS: **Cayuga Medical Center** **(607) 274-4011**
101 Dates Drive, Ithaca, NY 14850

Head north on N Meadow St toward W Court St.
Go 131 ft. and Take the 1st left onto W Court St.
Go 0.1 miles and turn left onto N Fulton St.
Go 476 ft. and turn right onto W Buffalo St
Go 0.3 miles Continue onto NY-96 N.
Go 2.2 miles and turn right onto Harris B Dates Dr. Extension.
Go 256 ft. and take the first left onto Harris B. Dates Dr.

A map with the route to the hospital is shown on Figure 1.

CONSTITUENTS OF CONCERN

Volatile Organic Compounds (VOCs), including tetrachloroethene (PCE) and its breakdown products trichloroethene (TCE), 1,1-dichloroethene (DCE), cis-1,2-DCE, trans-1,2-DCE and vinyl chloride (VC). Even though VC is a contaminant of concern, the highest concentration detected during the most recent groundwater monitoring event was 700 parts per billion (ppb), in a monitoring well located in the source area. Therefore, air monitoring for this compound is not necessary.

SCOPE OF WORK

Groundwater Monitoring

PROJECT HAZARD ANALYSIS

Task	Chemical Hzds.	Heat/ Cold Stress	Noise	Slip/ Trip/ Fall	Lifting Hzds.	Mechanical Hzds.	Electro-cution	Explosion	Water
Groundwater Monitoring	Med	Med	Low	Med	Med	Low	Low	NA	Med

High - Exposure likely more than 50% of the time
Med - Exposure likely 10 to 50% of the time
Low - Exposure likely less than 10% of the time
N/A – Exposure not anticipated

Additional information concerning project hazards and their control can be found in Section 5.0 and Table 1.

Task Description	Minimum Protective Clothing/Equipment Requirements
Groundwater Monitoring	Steel-toed boots, hard hat, safety glasses, nitrile gloves when handling potentially contaminated materials, surgical nitrile gloves for handling tubing. Tyvek as needed.

The HASP Preparer has conducted a Hazard Assessment for this project based on information provided by the Project Manager, in accordance with 29 CFR 1910.132(d).

For more information on Personal Protective Equipment (PPE) and respiratory protection requirements, see the Action Levels table and Section 7.0.

ENGINEERING CONTROLS TO BE USED (as applicable)

- Barricades and/or caution tape for delineation of work areas (exclusion zones)
- Natural wind forces to reduce exposure to airborne contaminants (stay upwind of excavation activities)
- Light-colored PPE to reduce solar load for heat stress control
- Cold weather clothing to prevent cold-weather hazards
- Avoid walking across areas of visible impact

For more information, see Section 5.0.

INSTRUMENTATION THAT MAY BE USED

_x_ Organic Vapor Monitor (OVM), PID

__ Photovac Microtip PID w/10.6 eV lamp

__ MultiRAE Plus (PID w/ 10.6 eV lamp, LEL, O_2, CO, H_2S sensors)

__ Q-Rae Monitor (HCN sensor), (NO & NO_2 sensors) (during drilling inside buildings)

__ Foxboro Organic Vapor Analyzer (OVA) Flame Ionization Detector (FID)

__ Miniram Real-time Dust Monitor

__ Draeger CMS – or equivalent (vinyl chloride)

__ TSI DustTrak

__ Noise Meter

For more information, see Section 6.0.

PERSONAL EXPOSURE SAMPLING

__ Will be conducted

__ Will be conducted if PID readings require the use of respiratory protection as described in the Action Level Table and in Section 6.2

_x_ Is not anticipated

For more information on monitoring, see Section 6.0.

HAZ-COM MATERIALS INVENTORY

Alconox (decontamination)
Isobutylene (calibration gas)
Fuel (equipment fuel – diesel or gasoline)

Action Levels for Photoionization Detector [PID]

PID Reading (above background)	Monitoring Location(s)	Actions Required	Personal Protective Equipment (PPE)
<10 parts per million (ppm)	Point of Operations/ Release Source Point; Site Worker Breathing Zone	Continue PID "periodic" monitoring at approximately 15-minute intervals or more frequently if visible contamination or odors are encountered.	Minimum site ensemble of steel-toed boots, safety glasses with attached side shields, hard hat, reflective vests and work gloves. Nitrile outer gloves and Nitrile inner gloves as necessary based upon contamination encountered. Coated Tyvek will be available for personnel use.
> 10 ppm (for > 1 minute)	Site Worker Breathing Zone; Perimeter Air Monitoring	Stop work; move upwind while vapors dissipate. If elevated levels remain, notify URS HSE staff and PM for additional instructions.	**For air monitoring personnel while work is stopped** – Minimum site ensemble PLUS: respirators with organic vapor cartridges and chemical-resistant boots or boot covers

HEALTH AND SAFETY EQUIPMENT LIST

Required	Not Required	
x		URS SMSs (relevant to project - see next page)
	x	Occupational Safety and Health Administration (OSHA) "Safety on the Job" Posters
x		Hardhats – at all times on site when not in vehicles
x		Safety glasses w/attached side shields and face shield/goggles.
x		Ear plugs or muffs -based on noise level monitoring
	x	Personal Floatation Device (PFD) – while working on boat or platform in "deep" water areas
x		Reflective safety vest
(x)		Tyvek® coveralls
(x)		Polycoated Tyvek® Q-23 coveralls
x		Steel-toed boots
(x)		Chemical-resistant steel-toed boots or chemical-resistant boot covers
x		Work gloves (as needed)
x		Nitrile outer gloves
x		Nitrile inner gloves
x		Plastic sheeting (visqueen) (as needed to reduce contamination)
	x	55-gallon 17-H drums (for contaminated solids)
x		55-gallon 17-E drums (for liquids)
x		Barricade tape and barricades
(x)		Wash tubs and scrub brushes
(x)		Decontamination solution (i.e., Alconox)
(x)		Folding chairs
x		portable eyewash bottles
(x)		Respirator sanitizing equipment
x		First aid kit
x		Infection control kit
x		Drinking water
x		Gatorade or similar drink
x		Type ABC fire extinguishers
	x	Half-face respirators approved by National Institute for Occupational Safety and Health (NIOSH)
(x)		Full-face respirators (NIOSH-approved)
(x)		Respirator cartridges (combination organic/P100)
x		MultiRAE Plus (PID w/[10.6] lamp, O_2, CO, H_2S Sensors) and calibration kit
	x	Rae Q-Rae Monitor (NO & NO_2 sensor) with calibration kit (for used during indoor drilling/geoprobe activities)
	x	Noise Meter
	x	Garden sprayers (for use in decontamination)
	x	Compressed gas horn (small pocket-size)
x		Duct tape
x		Paper towels and hand soap
x		Spill sorbent
x		Plastic garbage bags
x		Broom and/or shovel

(x) use dictated by site conditions

Note: Metatarsal protection is required during saw cutting, jack hammering, and pressure washing, minimally.

Note: Minimally, 1 kV dielectric gloves, currently stamped/tested, with leather protective gauntlets required for jack hammering, air lance use subsurface, digging bar subsurface, minimally. Additional note – digging bar must have a non-conductive (electrically) shaft.

URS SAFETY MANAGEMENT STANDARDS REFERENCED BY THIS HASP

URS SMS	TOPIC	HASP SECTION
2	Worker Right to Know	5.1.2
3	Emergency Action Plans	13.0
9	Corrosive and Reactive Materials	5.1
14	Fire Prevention	13.0
16	Hand Tools and Portable Equipment	5.2
17	Hazardous Waste Operations	3.0
18	Heat Stress	5.2.1
29	Personal Protective Equipment	7.0
30	Sanitation	11.1
32	Traffic Control	5.2.7
42	Respiratory Protection	8.0
47	Biological Hazards	5.3
48	Hazardous Materials/ Dangerous Goods Shipping	12.3
49	Incident Reporting	13.6
51	Blood-borne Pathogens	5.3
57	Vehicle Safety	5.2.7
59	Cold Stress	5.2.2
69	Manual Material Handling	5.2.5
72	Behavior Based Safety	5.0

These Safety Management Standards (SMSs) are available in electronic form from URS.

2.0 REMAINING CONTAMINATION

The 315 North Meadow site is a dry cleaner business located at the corner of North Meadow Street and Court Street in Ithaca, New York (Figure 2). The current operator of the business uses nonchlorinated mineral spirits for performing the dry cleaning. However, a previous owner of this business used tetrachloroethene (PCE) as the dry cleaning solvent. Due to spills or poor housekeeping in the past, PCE has been released to the environment at this site. The Final Engineering Report for the Site indicates the level of remediation which has been performed at the Site. The following presents a discussion on the remaining contamination present following the completion of the remediation.

2.1 Soil

Soil confirmation samples were taken following the limited soil excavation in August 2011. NYSDEC Part 375 soil cleanup objectives (SCOs) for unrestricted use were exceeded for PCE and/or methylene chloride in Areas II, III, IIIB, V (methylene chloride only), VIA, and VIB (methylene chloride only). SCOs for residential use are exceeded for PCE in Areas II and III. No SCOs are exceeded for restricted residential, commercial, or industrial use.

2.2 Groundwater

Post-remediation groundwater sampling and analysis was conducted in March 2015. PCE exceeds groundwater criteria at two monitoring well locations: upgradient monitoring well NM-MW-06S at 160 ppb (southwest of the building) and onsite in NM-MW-05S at 950 ppb (south of the east side of the building).

PCE degradation products were also detected which included: TCE, cis-1,2-dichloroethene, and vinyl chloride. TCE exceeded groundwater criteria at two monitoring well locations: upgradient monitoring well NM-MW-06S at 20 ppb (southwest of the building) and onsite in NM-MW-05S at 320 ppb (south of the east side of the building).

No VOCs were detected in sidegradient monitoring wells NM-MW-03S/03D, or in downgradient monitoring well NM-MW-08S. Only low level exceedances of cis-1,2-dichloroethene at 9.1 ppb (criteria is 5 ppb) and vinyl chloride at 13 ppb (criteria is 2 ppb) were detected in downgradient monitoring well NM-MW-12D.

2.3 Scope of Work

The scope of work for the project in support of the Site Management Plan includes groundwater monitoring on an annual basis.

3.0 APPLICABILITY

The purpose of this HASP, which was developed specifically for operations at the NYSDEC 315 N. Meadow Street Site (#755014), is to assign responsibilities, establish personal protection standards and mandatory safety procedures, and provide for contingencies that may arise while operations are being conducted at the site. This HASP complies with, but does not replace, Federal Health and Safety Regulations, as set forth in 29 CFR 1910 and 1926, and applicable state regulations. This HASP is to be used by all on-site personnel as a supplement to these rules, regulations, and guidance. This HASP is to be augmented by the URS Health, Safety, and Environment Program and Management System; relevant standards from that program and system are required to be available on site during all activities.

The provisions of this HASP are mandatory for all onsite URS employees and URS subcontractors (if utilized). URS is providing a copy of this HASP to each site subcontractor to fulfill its obligation under 29 CFR 1910.120(b) to inform subcontractors of site hazards. In turn, each subcontractor will provide documentation to URS that verifies appropriate training as required by OSHA. Subcontractor employees shall sign the Safety Plan Compliance Agreement to acknowledge receipt and adherence to this HASP. In addition, URS will provide a documented HASP review with all project participants immediately prior to commencement of site investigation activities. Should any new personnel arrive at the site after this HASP review was given, URS will give those new workers a documented HASP review. See also SMS 017 (Hazardous Waste Operations).

3.1 Management of Change

Changing and/or unanticipated site conditions may require modification of this HASP to maintain a safe and healthful work environment. Any proposed changes (addendums) to this plan must be reviewed by the URS Regional Health, Safety, and Environmental Manager (RHSEM) prior to their implementation. In addition, all HASP addenda will be reviewed and considered acceptable for use by the New York State Department of Environmental Conservation (NYSDEC) prior to its implementation. Under no circumstances will modifications to this plan conflict with federal, state, or other governmental health and safety regulations.

4.0 RESPONSIBILITIES

URS will have site safety and health oversight and coordination responsibilities for all onsite personnel.

URS will adhere strictly to the provisions of this HASP, along with applicable regulations issued by governmental entities.

4.1 Project Manager (URS)

The URS Project Manager (PM) will direct onsite operations. The PM may delegate all or part of these duties to a properly qualified URS employee who is designated as the Site Safety Officer. At the site, the PM, assisted by the Site Safety Officer (SSO), has primary responsibility for the following.

- Seeing that appropriate PPE and monitoring equipment are available and properly used by all onsite personnel.
- Establishing that all onsite personnel are aware of the provisions of this HASP, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies.
- Establishing that all onsite personnel have completed a minimum of 40 hours of health and safety training, have appropriate medical clearance, as required by 29 CFR 1910.120, and have been fit tested for the appropriate respirators.
- Seeing that all onsite personnel are aware of the potential hazards associated with site operations.
- Monitoring the safety performance of all onsite personnel to see that required work practices are employed.
- Correcting any work practices or conditions that may result in injury or exposure to hazardous substances.
- Preparing any accident/incident/investigation reports for onsite activities in conjunction with the RHSEM.

- Seeing to the completion of Safety Plan Compliance Agreements by all onsite personnel.
- Halting site operations, if necessary, in the event of an emergency or to correct unsafe work practices.
- Seeing that the appropriate SMSs are available on site (see "Plan-at-a-Glance").
- Reviewing and approving this project HASP.

4.2 Site Safety Officer (URS)

For the Remedial Investigation, the SSO's duties will be carried out by the Onsite Geologist. The SSO is responsible for the following.

- Implementing the project HASP and reporting any deviations from the anticipated conditions described in that plan to the PM and, if necessary, the URS HSE Representative and/or the RHSEM.
- Determining that monitoring equipment is used properly by all onsite personnel and calibrated in accordance with manufacturer's instructions or other standards and that the results are properly recorded and filed.
- Checking with a URS HSE Representative to assure all URS onsite personnel have current medical clearance and training.
- Assuming any other duties as directed by the PM, HSE Representative, or RHSEM.
- Coordinating with the URS HSE Representative, and/or the RHSEM to identify all onsite personnel on site for whom special PPE, exposure monitoring, or work restrictions may be required.
- Conducting safety meetings for all site personnel in accordance with Section 14.0 of this HASP.
- Conducting daily site inspections prior to the start of each shift. All inspections must be documented (preferably in a bound field logbook).
- Providing ongoing review of protection level needs as project work is performed and informing the PM of the need to upgrade/downgrade protection levels, as appropriate.

- Seeing that decontamination procedures described in Section 11.0 are followed by all onsite personnel.
- Coordinating monitoring of URS onsite personnel with the HSE Representative and the RHSEM (as needed) and assuring proper recording of the results of exposure evaluations.
- Halting site operations, if necessary, in the event of an emergency or to correct unsafe work practices.

4.3 Regional Health, Safety, and Environmental Manager (URS)

The RHSEM is responsible for:

- Providing health and safety support as requested by the SSO, PM, and the HSE Representative. This includes oversight of any URS employee exposure monitoring as described in this HASP.

4.4 Project Personnel

Project personnel involved in onsite investigations and operations are responsible for:

- Taking all reasonable precautions to prevent injury to themselves and to their fellow employees;
- Performing only those tasks that they believe they can do safely and immediately reporting any accidents and/or unsafe conditions to the SSO or PM;
- Implementing the procedures set forth in the HASP and reporting any deviations from the procedures described in that HASP to the SSO or PM for action;
- Notifying the PM and SSO of any special medical problems (i.e., allergies) and seeing that all onsite personnel are aware of such problems; and
- Reviewing the project HASP and signing the Safety Plan Compliance Agreement.

4.5 Contractor

Contractors will not be used during these activities. If for any reason it is determined that contractors will be used due to a modification of the scope of work, then a separate addendum for subcontractors will be made to this HASP.

5.0 JOB HAZARD ANALYSIS

A site-specific Job Hazard Analysis is provided in Table 1 which has been developed based on SMS 072.

5.1 Chemical Hazards

Two categories of chemical hazards are associated with site activities:

- Site constituents; and
- Chemicals used to conduct the site work.

Site constituents are organic substances that may be associated with residues from the historic operations of the former distribution center for laundry and dry-cleaning supplies and which may be present and or encountered in the subsurface at the site. The chemicals that are brought on site to conduct the work may be hazardous and subject to regulation under OSHA's Hazard Communication Standard (29 CFR 1910.1200).

Byproducts from the historical operations of the distribution center for laundry and dry-cleaning supplies may include hazardous substances, such as VOCs (e.g., PCE).

5.1.1 Site Constituents

From an occupational health standpoint, given that any potential exposure to site personnel will be only for a short period of time (intermittent for several days), the levels of contaminants that have been, or could be, encountered during site activities should not represent a significant concern if the provisions of this HASP are appropriately implemented. However, given that the site is still under investigation, the potential for exposure to elevated levels of these contaminants may exist. Exposure to elevated levels of these contaminants may pose hazards. Specific constituent hazards are detailed in Table 1. Overviews of these hazards are presented here in terms of the following types of occupational exposure limits:

- PEL Permissible Exposure Limit (OSHA Standard)
- TLV Threshold Limit Value (American Conference of Governmental Industrial Hygienists [ACGIH] Guidance)

- STEL Short Term Exposure Limit
- C Ceiling

OSHA PELs, and ACGIH TLVs, are time-weighted averages (TWAs), which are defined as concentrations for a normal 8-hour work day and 40-hour work week to which almost all workers can be exposed repeatedly without suffering adverse health effects.

STEL is defined as the concentration to which workers can be exposed for short time periods without irritation, tissue damage, or narcosis sufficient to be likely to cause impairment of self-rescue or to precipitate accidental injury. The STEL is a 15-minute TWA that will not be exceeded at any time during the workday. STELs are used by OSHA, and ACGIH, for chemical exposure criteria.

A ceiling value (C) is a concentration that will not be exceeded at any time in any workday. Ceiling limits are used by OSHA, and ACGIH, for chemical exposure criteria.

Skin contact with potentially contaminated materials will be minimized by the use of personal protective clothing (as described in Sections 1.0 and 7.0). Air monitoring and the use of engineering controls will minimize inhalation of vapors or particulates during site activities, and respiratory protection will be used if the action levels described in Section 1.0 are exceeded. Ingestion of contaminated materials will be minimized by the use of appropriate personal hygiene procedures during decontamination (i.e., thoroughly washing face and hands with soap and water after leaving the work area and prior to eating or drinking). See SMS 009 (Corrosive and Reactive Materials).

5.1.2 Hazard Communication Materials

Materials that are considered hazardous materials under the OSHA Hazard Communication Standard (29 CFR 1910.1200) may be used during this project (possibly including acids for sample preservation, and solvents for equipment decontamination). In accordance with the URS Hazard Communication Program, the Safety Data Sheets (SDSs) for the hazardous materials listed in Section 1.0 are included in Attachment A. The SSO will make copies of these SDSs available to any subcontractors (if utilized) on this project.

URS' written Hazard Communication Program is located in SMS 002.

5.2 Physical Hazards

Physical hazards at this work site include:

- Heat stress and/or cold stress, depending on the time of year the work will be performed;
- Hand tools and portable equipment (SMS 016);
- Noise from the operation of site equipment;
- Slip-trip-fall types of accidents;
- Back/shoulder an or other injuries resulting from improper lifting (manual material handling);
- Moving vehicles;
- Being caught in or struck by moving equipment;

5.2.1 Heat Stress Recognition and Control

Heat stress monitoring will commence when personnel are wearing PPE, including Tyvek®-type coveralls, and the ambient temperature exceeds 70°F. If standard work garments (cotton coveralls) are worn, monitoring will commence at 85°F. Heat stress monitoring and control guidance can be found in SMS 018.

5.2.2 Cold Stress Recognition and Control

Protection against cold stress will be initiated when temperatures drop below 45°F. Cold stress guidance is provided in SMS 059.

Exposure to cold working conditions can result in cold stress (hypothermia) and/or injury (frostbite) to hands, feet, and head. Hypothermia can result when the core body temperature drops below 36°C (96.8°F). Lower body temperature will be likely to result in dizziness, drowsiness, disorientation, slurred speech, or loss of consciousness, with possible fatal consequences. Pain in the extremities may be the first warning of danger from cold stress. Shivering develops when the body temperature falls to 35°C (95°F).

Hypothermia can be brought on by exposure to cold air, immersion in cold water, or a combination of both. The wind chill factor, which is the cooling power of moving air, is a critical factor in cold stress.

Workers must wear adequate insulating clothing if work is performed in temperatures below 4°C (40°F). At temperatures of 2°C (35.6°F or less), workers whose clothing becomes wet will be provided immediately with a change of clothing and, if necessary, treated for hypothermia. Treatment includes warming the victim (with skin-to-skin contact or by providing warm blankets or other coverings) and providing warm liquids for the victim to drink. Skin exposure will not be permitted at temperatures of -32°C (-25°F) or below.

If fine work is to be performed with bare hands for more than 10 to 20 minutes at temperatures below 16°C (60°F), provisions will be made for keeping the workers' hands warm. If equivalent chill temperatures fall below 40°F, and fine manual dexterity is not required, gloves will be worn. Metal handles of tools will be covered with insulating material at air temperatures below -1°C (30°F).

If work is to be performed continuously in the cold when the wind chill factor is at or below -7°C (19°F), heated warming shelters (tents, trailers, vehicle cabs) will be made available nearby.

5.2.3 Noise Hazards

Noise hazards are not expected to be encountered during these activities. If for any reason it is determined noise hazards will be encountered due to a modification of the scope of work, then a separate addendum for Noise Hazards will be made to this HASP.

5.2.4 Slip/Trip/Fall Hazards

Workers shall exercise caution when walking around the site to avoid fall and trip hazards. If there are holes or uneven terrain in the work area that could cause site personnel to fall or trip, they must be covered, flagged, or marked to warn workers. If conditions become slippery, workers should take small steps with their feet pointed slightly outward to decrease the probability of slipping. Workers shall watch where they are walking and walk only in areas of good stability.

5.2.5 Lifting Hazards

The guidelines listed below will be followed whenever lifting equipment such as portable generators, coolers filled with samples, and any other objects that are of odd size or shape or that weigh over 40 pounds. Safe lifting procedures are described in SMS 069.

- Get help when lifting heavy loads. Lift portable generators using a two-person lift.
- When moving heavy objects, such as drums or containers, use a dolly or other means of assistance.
- Plan the lift. If lifting a heavy object, plan the route and where to place the object. In addition, plan communication signals to be used (i.e., "1,2,3, lift," etc.)
- Wear sturdy shoes that are in good condition and supply traction when performing lifts.
- Keep your back straight and head aligned during the lift, and use your legs to lift the load – do not twist or bend from the waist. Keep the load in front of you – do not lift or carry objects from the side.
- Keep the heavy part of the load close to your body to help maintain your balance.

5.2.6 Underground and Aboveground Utilities

Underground or aboveground utilities are not expected to be encountered during the monitoring activities.

5.2.7 Work Area Protection

Project operations will be undertaken in a parking lot, causing motor vehicles to pose a hazard. Consideration should be given to parking work vehicles within the coned area between the work area and oncoming traffic. In addition, all work shall follow procedures for work zone traffic control provided in SMS 032. See also SMS 057 (Vehicle Safety).

5.2.8 Drilling Hazards

No drilling will be conducted during these activities. If for any reason it is determined that drilling will be required due to a modification of the scope of work, then a separate addendum for Drilling Procedures will be made to this HASP.

5.2.9 Excavation

There are no excavation activities under the current scope of work. If for any reason it is determined that excavations are required due to a modification of the scope of work, then a separate addendum for Excavation Procedures will be made to this HASP.

5.2.10 Confined Space Procedures

Under the current scope of work, no confined spaces will be entered by URS personnel or subcontractors (if utilized). If for any reason it is determined that entry into confined/enclosed spaces is required due to a modification of the scope of work, then a separate addendum for Permit Required Confined Space Procedures will be made to this HASP. Entry into confined spaces by site personnel shall be performed in accordance with 29 CFR 1910.146.

5.3 Biological Hazards

Potential biological hazards include illnesses and/or injuries transmitted by plants, insects, animals, and pathogenic agents. There are many plants, animals, and insects that are potentially harmful to humans that include: ticks, poison ivy/poison oak, certain spiders, mosquitoes, and poisonous snakes. Refer to SMS 047 for specific information on these hazards.

Blood-borne pathogens (BPs) include diseases that can be transmitted by contact with blood or other bodily fluids as well as contaminated items which may be encountered on this urban site (e.g., used syringes, etc.). Universal precautions shall be used when administering first aid. Good hygiene practices and proper decontamination of non-disposable PPE will minimize potential for transmission of BPs. Refer to SMS 051 for additional information.

6.0 WORKER EXPOSURE MONITORING PLAN

Heat and cold stress, noise, and chemical exposures may be encountered at this site. Heat and cold stress monitoring and prevention are addressed in Section 5.2.

6.1 Chemical Exposure Monitoring

The field instrumentation described in this HASP has been specifically selected for the contaminants that may be reasonably anticipated to be encountered during the course of this project. Selection factors include anticipated airborne concentrations, potential interference, ionization potentials, instrument sensitivity, and occupational exposure limits. The action levels specified in Section 1.0 were established with the expectation that specific instruments will be used.

The monitoring equipment specified in Section 1.0 will be used on a regular basis to evaluate the potential for exposure to airborne contaminants. Action levels and responses for chemical exposure monitoring are provided in tables located in Section 1.0 of this HASP.

6.2 Background Readings

All direct-reading instrument readings will be evaluated relative to background readings, not "meter zero". Prior to the start of work at each shift, and whenever there is a significant shift in wind direction, instrument readings will be obtained upwind of the site work zone to determine the level of "background" readings from such things as local vehicle traffic or emissions from nearby operations unrelated to the site. Site readings will be evaluated against these background readings (i.e., if an action level is listed as 20 parts per million [ppm], it is evaluated as 20 ppm above background). The SSO will consult with the industrial hygienist regarding the potential health hazards associated with background readings above 5 ppm.

6.3 Data Logging

All monitoring data, including background readings, will be logged in the field logbook. The results of daily instrument calibrations can be logged in a field logbook. All monitoring instruments will be calibrated in accordance with the manufacturers' instructions prior to the start

of each shift. Calibration also will be performed when inconsistent or erratic readings are obtained.

6.4 Dust Control

Dust hazards are not expected to be encountered during these activities. If for any reason it is determined dust hazards will be encountered due to a modification of the scope of work, then a separate addendum for Dust Hazards will be made to this HASP.

6.5 Explosive Atmospheres

Explosive atmospheres are not expected to be encountered during these activities. If for any reason it is determined explosive atmospheres will be encountered due to a modification of the scope of work, then a separate addendum for Explosive Atmospheres will be made to this HASP.

.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The minimum Personal Protective Equipment (PPE) ensemble for all onsite personnel includes:

- Hardhat (ANSI approved);
- Safety glasses with side shields (or impact-resistant goggles);
- Steel-toed boots or chemical-resistant steel-toed boots; (ANSI-rated);
- Hearing protection within a 25 foot radius of operating equipment and/or whenever nose monitoring equipment indicates noise levels at or greater than 85 dB;
- Work gloves and/or chemical-resistant gloves; and
- Tyvek® or coated-Tyvek® as specified in this plan.

As the various monitoring action levels are reached, additional PPE is required. Section 1.0 describes the incremental PPE requirements relative to specific action levels and the specific kinds of PPE to be used. Procedures for the use and selection of PPE are provided in SMS 029.

7.1 Limitations of Protective Clothing

The protective equipment ensembles selected for this project are anticipated to provide protection against the types and concentrations of hazardous materials that may be encountered during field operations. However, no protective garment, glove, or boot is resistant to all chemicals at any concentration; in fact, chemicals may continue to permeate or degrade a garment even after the source of the contamination is removed.

To obtain optimal usage from PPE, the following procedures are to be followed by all onsite personnel.

- When using Tyvek® coveralls, don a clean, new garment after each rest break or at the beginning of each shift or when they become damaged or torn.
- Inspect all clothing, gloves and boots both prior to and during use for:
  - Imperfect seams;

- Non-uniform coatings;
- Tears; and
- Poorly functioning closures.

- Inspect reusable garments, boots, and gloves prior to and during use for:
  - Visible signs of chemical permeation, such as swelling, discoloration, stiffness, or brittleness; and
  - Cracks or any signs of puncture or abrasion.

Reusable garments exhibiting any of these characteristics will be discarded.

7.2 Duration of Work Tasks

The SSO will establish the duration of work tasks in which personnel use PPE ensembles that include chemical protective clothing (including Tyvek® as specified in this plan). Variables to be considered include ambient temperature and other weather conditions, the capacity of individual personnel to work in the required level of PPE in heat and cold, and the limitations of specific PPE ensembles. Recommended rest breaks are as follows:

- Fifteen minutes midway between shift startup and lunch;
- Lunch break (30 to 60 minutes); and
- Fifteen minutes midway between lunch and shift end.

Rest breaks are to be taken in the support zone or other clean area after personnel have completed the decontamination process, including washing the hands and face with soap and water. [Additional rest breaks will be scheduled according to heat stress monitoring protocols as described in SMS 018.]

8.0 SITE CONTROL

8.1 General

Barricades (i.e., channelized cones and poles) will be used to delineate a work zone for safety purposes around the monitoring work area. In addition, procedures for work zone traffic control are provided in SMS 032. New York State Department of Transportation (NYSDOT) approved barriers (e.g., channelized cones and poles) will be set up with provisions for sight impaired members of the public for all sidewalk work. The barriers will be set in a 25-foot radius (as practical) around the work area to provide sufficient maneuvering space for personnel and equipment. A short piece of barricade tape can be affixed to a secure upright (e.g., vehicle antenna) to serve as a wind direction telltale. A 5-foot opening in the barricades at the support zone (upwind of the work area) will serve as the personnel and equipment entry and exit point. Site personnel shall continuously monitor the opening at all times to prevent members of the public from entering the work area.

The personnel decontamination station will be established if formal decontamination procedures are required based on the potential exposure to contaminated materials and the type of task being performed (to be determined by the SSO). All entry and exit from the work area will be made at this opening to control potential sources of contamination and leave contaminated debris in the work area. The PM or SSO will determine an upwind evacuation area prior to each shift and changed based on wind direction, and all personnel will be notified of its location.

8.2 Work Zones

If monitoring instrument readings exceed 10 ppm (VOCs) for greater than one minute, requiring the use of chemical protective equipment, work zones must be established as described below. Refer to Action Level Table for PPE requirements as specified in this HASP (Section 1.0).

- Exclusion Zone (EZ) – A 25-foot radius (or as practical) around the work area will be defined before work starts. The encircled area will constitute the EZ. This zone is where potentially hazardous contaminants and physical hazards to the workers will be contained. Appropriate personal protection, as described in Section 1.0, will be required in this area. Plastic sheeting (i.e., 2- or 3- mil) and/or tarps may be used as

necessary to control contaminated materials spilled to the ground during site operations. The size of the EZ may be altered to accommodate site conditions and to ensure contaminant containment.

- Contaminant Reduction Zone (CRZ) – A corridor leading from the EZ will be defined using safety cones and tape; it will lead from the work area to a break area. All decontamination activities will occur in the CRZ. A waste container will be placed at the end of the corridor so that contaminated disposable equipment can be placed inside and covered. Surface/soil contamination in this area will be controlled using plastic sheeting. No one will be permitted into the CRZ or EZ unless he/she is in full compliance with the requirements of this HASP.

- Support Zone – A Support Zone, the outermost part of the site, must be defined for each field activity. Support equipment is located in this uncontaminated or clean area. Normal work clothes are appropriate within this zone. The location of this zone depends on factors such as accessibility, wind direction (upwind of work area), and resources (i.e., roads, shelter, utilities).

9.0 DECONTAMINATION PROCEDURES

The following steps will be followed whenever personnel leave the exclusion zone/work area:

1. Remove all equipment, containers, and notes to the CRZ. All waste and spent decontamination solutions will be properly contained.

2. If necessary, scrub boots with a stiff bristle brush and a solution consisting soap (Alconox) and water. If necessary, washtubs and chairs will be provided.

3. Remove outer gloves.

4. If used, remove Tyvek® coverall; discard in provided container.

5. Remove hardhat and eye protection.

6. Remove inner gloves.

7. Wash hands and face

The decontamination area will be covered with plastic sheeting that will be replaced when torn or heavily soiled and at the end of each shift.

Each worker will be responsible for cleaning, sanitizing, and storing his/her own respirator in accordance with the manufacturer's guidance (i.e., washing in warm water and detergent or sanitizing solution, air drying, and storing in a plastic storage bag).

All spent decontamination fluids (rinse waters, etc.) will be handled as directed by the PM and in accordance with relevant regulations.

9.1 Sanitation

Potable water will be made available at the site, either from a pressurized source or as commercially available bottled water. Drinking cups will be supplied; personnel will not drink directly from the source of water or share drinking cups. Sources of non-potable water will be labeled clearly.

Washing facilities will be provided on site and be located in the decontamination area or in the support area. Soap, clean water, wash basins, and/or single-use towels will be available for personnel use. Sanitation standards may be found in SMS 030.

9.2 Decontamination – Medical Emergencies

In the event of physical injury or other serious medical concerns, immediate first aid is to be administered in lieu of further decontamination efforts.

See the Emergency Decontamination chart for a decision tree for emergency decontamination.

9.3 Decontamination of Tools

When all work activities have been completed, contaminated tools used by URS personnel will be appropriately decontaminated or properly disposed of based on analytical data and/or visual evidence of contamination. In the event that a pressure washer is used for decontaminating equipment, personnel will wear a full face shield and the Pressure Washing Operator will wear metatarsal protection when operating the pressure washer equipment.

All investigation derived waste (IDW) will be contained in new USDOT-approved 55-gallon drums and temporarily staged at an approved location. If a temporary staging area is available, URS will collect representative samples of the IDW for proper waste characterization (as determined by the disposal facility). If a temporary staging area is not available, URS will have the drums picked up on a daily basis. If a temporary staging area is not available, the IDW subcontractor performing the daily pick up will collect representative samples of the IDW for proper waste characterization with analysis to be performed with a three-day turnaround time. All waste will be disposed of at a permitted off-site disposal facility.

It is expected that all tools will be constructed of non-porous, non-absorbent materials. This will aid the decontamination process. Any tool or part of a tool that is made of a porous/absorbent material will be discarded and properly disposed of based on analytical data if it cannot be properly decontaminated.

10.0 SAFE WORK PRACTICES

10.1 General Site Rules

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited during monitoring activities or where the possibility for the transfer of contamination exists.
- All personnel will enter designated work areas only through the CRZ. All personnel leaving an EZ/work zone must exit through the CRZ and pass through the decontamination station, as described in Section 10.0.
- Personnel will wash their hands and faces thoroughly with soap and water prior to eating, drinking, or smoking.
- Personnel will avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling, leaning, or sitting on contaminated surfaces. Do not place monitoring equipment on potentially contaminated surfaces (i.e., the ground, etc.)
- Field survey instruments, such as PIDs, may be covered with plastic or similar coverings to minimize the potential for contamination.
- Contaminated protective equipment, such as respirators, hoses, boots, and disposable protective clothing, will not be removed from the work area/EZ or decontamination area until it has been cleaned or properly packaged and labeled.
- Field crew members shall be familiar with the physical characteristics of the site operations including:
    - Wind direction in relation to the contaminated area;
    - Accessibility to equipment and vehicles;
    - Areas of known or suspected contamination;
    - Site access; and
    - Nearest water sources.
- All wastes generated by URS activities at the site will be disposed of as directed by the PM.
- All personal protective equipment will be used as specified and required.
- The buddy system will be used at all times.

- Personnel are to immediately notify the SSO of any accidents or injuries.
- No engines idling for more than 3 minutes unless required by operation (e.g., generator).

11.0 EMERGENCY RESPONSE PLAN

The route map to the nearest hospital – Cayuga Medical Center – (607) 274-4011 is located in Figure 1.

It is URS policy to evacuate personnel from areas of hazardous material emergencies and to summon outside assistance from agencies with personnel trained to respond to the specific emergency. This section outlines the procedures to be followed by URS personnel in the event of a site emergency and has been written in accordance with SMS 003. These procedures are to be reviewed during the onsite safety briefings conducted by the SSO.

In the event of a fire (SMS 014) or medical emergency, the emergency numbers identified in Section 1.0 can be called for assistance.

11.1 Places of Refuge

In the event of a site emergency requiring evacuation, all personnel will evacuate to a pre-designated area a safe distance from any health or safety hazard. The primary assembly area will be determined prior to the start of work each day.

During any site evacuation, all workers will be instructed to observe wind direction indicators. During evacuation, employees will be instructed to travel upwind or crosswind of the area of influence.

11.2 Communication

A communication network must be set up to alert site personnel of emergencies and to summon outside emergency assistance. All team members should maintain the list of emergency phone numbers. At least one team member shall have a cell phone, on, and in good working order.

In the event of an emergency, personnel will use the following hand signals where voice communications are not feasible:

Signal	Definition
Hands clutching throat	Out of air/can't breathe
Hands on top of head	Need assistance
Thumbs up	OK/I'm all right/I understand
Thumbs down	No/negative
Arms waving upright	Send back support
Grip partner's wrist	Exit area immediately

11.3 Emergency Response Procedures

The emergency response team will consist of workers who assume the following roles:

- Emergency care provider(s)
- Provide first aid/CPR as needed
- Communicator

The role of the communicator is to maintain contact with appropriate emergency services and to provide as much information as possible, such as the number injured, the type and extent of injuries, and the exact location of the accident scene. The communicator will be located as close to the scene as possible to transmit to the emergency care providers any additional instructions that may be given by emergency services personnel in route.

- Site Supervisor

  The site supervisor (usually the SSO) will survey and assess existing and potential hazards, evacuate personnel as needed, and contain the hazard. Follow up responsibilities include replacing or repairing damaged equipment, documenting the incident, and notifying appropriate personnel/agencies described under Incident Reporting. Responsibilities also include reviewing and revising site safety and contingency plans as necessary.

The Emergency Response Checklist can be used to help remember the things to do in an emergency.

11.4 Medical Emergency Response Plan

At least one URS employee on site will hold a current certificate in American Red Cross Standard First Aid. This training provides six and one-half hours of instruction in adult CPR and basic first aid. If a medical emergency exists, personnel should:

- Consult the emergency phone number list and request an ambulance immediately;
- Perform First Aid/CPR as necessary;
- Stabilize the injured; decontaminate if necessary, and extricate *only* if the environment the injured/ill person is in is dangerous or unsafe and ONLY if the rescuers are appropriately protected from potential hazards that might be encountered during the rescue.
- When emergency services personnel arrive, communicate all first aid activities that have occurred.
- Transfer responsibility for the care of the injured/ill to the emergency services personnel.

The following items and emergency response equipment will be located within easy access at all times:

- First aid kit and infection control kit;
- Eyewash – A 15 minute eyewash (required if corrosives are present), or an appropriate amount of portable sterile eyewash bottles, will be available on site for flushing foreign particles or contaminants out of eyes. The SSO will demonstrate the proper operation of the unit(s) prior to the start of work. The eyewash station or portable eyewash bottles will be kept in the onsite vehicle until needed to prevent freezing under cold weather conditions; and,
- Emergency telephone numbers list

11.5 Fire and/or Explosive Conditions

Contingency procedures will immediately be implemented upon notification that any of the following scenarios involving fire and/or explosion is imminent or has occurred:

- a fire that causes, or could cause, the release of toxic fumes;
- a fire that could possibly ignite nearby flammable materials or could cause heat-induced explosions;
- a fire that could possibly spread to off-site areas;
- a danger exists that an explosion could occur causing a safety or health hazard; and
- an explosion has occurred.

When fire or explosion appear imminent or have occurred, all normal activity in affected areas will cease. The SSO will make an assessment of the potential risk and severity of the situation to decide whether the emergency event will or will not be readily controllable with existing portable fire extinguishers or site equipment and materials at hand. Firefighting will not be done at the risk to site workers. The City of Ithaca Fire Department (IFD) will be contacted in all situations in which fires and/or explosions have occurred. The following steps will be taken for localized fire.

- contact IFD (dial 911);
- move all personnel to an upwind location at an appropriately safe distance away;
- determine if fire is within on-site personnel capabilities to attempt initial firefighting;
- determine if smoke and/or fumes from fire are potentially impacting offsite areas;
- if the fire is not impacting offsite areas and is within on-site personnel capabilities, utilize most appropriate means of extinguishing fire (e.g., fire extinguishers, water, covering with soil, etc.); and
- once fire is extinguished, containerize and properly dispose of any spilled material, runoff, or soil.

If the situation appears uncontrollable and poses a direct threat to human life, IFD will be contacted and the Evacuation Plan will be implemented. If the chances of an impending explosion are high, the entire area within a 1,000-foot radius of the fire source will be evacuated. The SSO will alert personnel when all danger has passed, as determined by the chief fire fighter from IFD All equipment used in the emergency will be cleaned and refurbished as soon as possible after the emergency has passed so that it will be ready for use in the event of any future emergency.

11.6 Incident Report

ALL site injuries and illnesses must be reported to the SSO and PM immediately following first-aid treatment. The SSO will notify the URS RHSEM or the URS HSE Representative (***Steve Moeller 716-923-1112***). Any near miss, injury or illness, regardless of severity, is to be reported (see SMS 049).

11.7 Spill or Hazardous Materials Release

All spills are immediately reported to the SSO and the NYSDEC and are dealt with according to the chemical manufacturer's recommended procedures, which are found on the SDS. Steps will be taken to contain and/or collect spills for approved storage and disposal. .

EMERGENCY RESPONSE CHECKLIST

In an Emergency	Yes	No
Confirm the reported incident		
Evacuate and secure the area		
Render first aid/emergency medical care		
Notify promptly:		
URS HSE Representative and/or URS RHSEM		
Project Manager		
Fire Department		
Police Department		
Nearest Hospital or Medical Care Facility		
Start Documentation		
If spill or leak occurs:		
Notify the NYSDEC		
Don the proper PPE		
Stop the source		
Contain the spill		
Clean up the spill		
Upon evacuating, take attendance at the assembly area		
Authority given:		
Leave the site		
Restart the operations		
Debrief and document the incident		
Submit a copy of the document to the Health and Safety Manager		

12.0 TRAINING, MEDICAL SURVEILLANCE, SITE INSPECTIONS

12.1 Training and Medical Surveillance

All URS site personnel and subcontractor workers (if utilized) will have met the requirements of 29 CFR 1910.120(e), including:

- Forty hours of initial off-site training or its recognized equivalent
- Eight hours of annual refresher training for all personnel (as required);
- Eight hours of supervisor training for personnel serving as SSOs; and
- Three days of work activity under the supervision of a trained and experienced supervisor.

All onsite personnel are participating in medical surveillance programs that meet the requirements of 29 CFR 1910.120(f). Current copies of training certificates and statements of medical program participation for all URS personnel and subcontractor workers are maintained by the local office.

In addition, all URS site personnel and subcontractor workers will be involved in a review of this HASP and sign a copy of the Safety Plan Compliance Agreement. The PM will maintain these agreements at the site and place them in the project file at the conclusion of the operation. URS will provide a documented HASP review with all project participants prior to commencement of site investigation activities. Should any new personnel arrive at the site after this HASP review was given, URS will also provide new workers a documented HASP review.

Prior to the start of operations at the site, the SSO will conduct a site safety briefing, which will include all personnel involved in site operations. At this meeting, the SSO will discuss:

- Contents of this HASP;
- Types of hazards at the site and means for minimizing exposure to them;
- The type of monitoring that will be performed;
- Action levels for upgrade and downgrade of PPE;

- PPE that will be used;
- Site-specific respiratory protection requirements;
- Decontamination protocol;
- Site control measures, including safe operating practices and communication;
- Location and use of emergency equipment; and
- Evacuation signals and procedures.

All site personnel, including subcontractor personnel, are to attend the briefings and sign the briefing form, which may be found in Appendix A of the FSP (Part A).

Subsequent site safety briefings will be conducted at least weekly, or whenever there is a change in task or significant change in task location. Briefings also will be conducted whenever new personnel report to the site. Daily documented pre-job briefings will be held prior to the start of each shift. These briefings will discuss the scope-of-work for that shift, the hazards associated with that scope, the controls to be used (Engineering, Administrative, PPE) to mitigate those hazards. The documentation will include the items discussed in the pre-job briefing as well as signatures of those in attendance.

12.2 Site Inspections

The URS SSO is to conduct a daily site inspection prior to the start of each shift. It is the responsibility of the PM or SSO to resolve discrepancies immediately, contacting the RHSEM if necessary for assistance. Inspections are to be documented and maintained on site until the completion of the project, at which time they are placed in the project files.

13.0 RECORDKEEPING

The PM and SSO are responsible for site recordkeeping. Prior to the start of work, they will review this HASP; if no changes are needed, they will sign the approval form (PM) or acceptance form (SSO) and forward a copy to the RHSEM.

All URS personnel and subcontractor workers (if utilized) will be involved in a HASP review session, given by the Contractor (URS) and sign the Safety Plan Compliance Agreement; copies of these forms will be maintained in the project file.

The SSO will conduct a Site Safety Briefing in accordance with Section 14.1and have all attendees sign the Safety Plan Compliance Agreement; copies will be maintained in the project file.

Any incident or exposure incident will be investigated and the Incident Report form (SMS 049) will be completed and forwarded to the Office H&S Representative or the RHSEM.

All instrument readings and calibrations, PPE use and changes, health and safety-related issues, and deviations from or problems with this HASP will be recorded in the field log. Should a change occur in the Scope-of-Work, hazards on site, or any other item that would require a revision to the HASP, the revisions, hereafter called HASP Addenda, shall be submitted to NYSDEC review/acceptance before commencement with that new condition on site.

14.0 WORK AREA AIR MONITORING PLAN

Real time air monitoring for volatile organic compounds (VOCs will be conducted at the work site.

The same monitoring equipment specified in Section 6.0 of this HASP will be utilized to document work area levels of VOCs. Measurements will be obtained generally on 15-minute intervals at various locations both upwind and downwind of the working areas. The on-site Geologist will document the locations of the monitoring points on a site sketch and in a field book.

If total organic vapor levels exceed 10 ppm above background for greater than one minute, work activities will be temporarily halted. If air monitoring readings drop below action levels, work will continue. If levels exceed 10 (1) ppm again, the work will be halted and corrective measures will be implemented.

FIGURES

Legend

Site Boundary

100 0 100

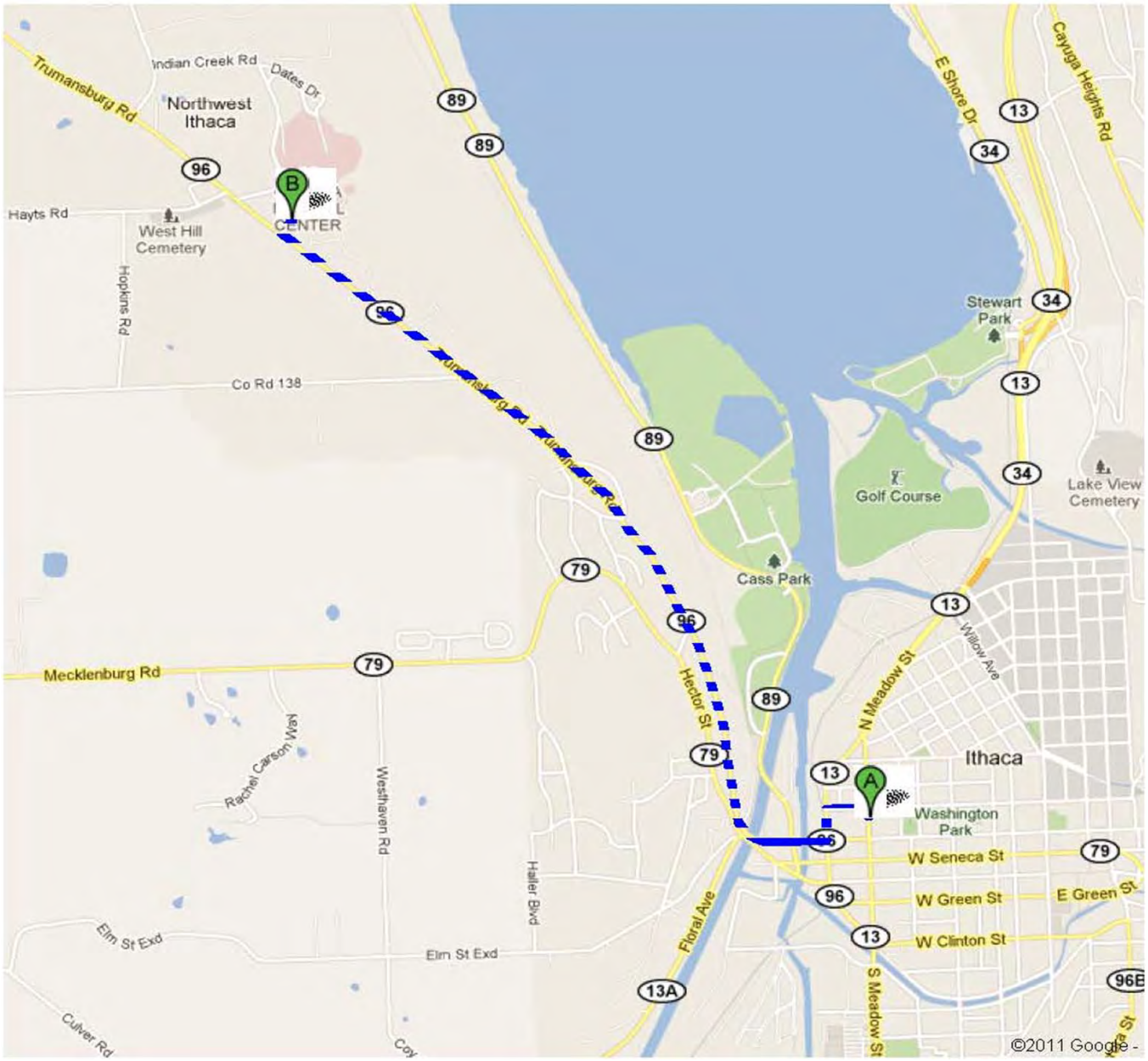
Feet

URS

315 NORTH MEADOW STREET
SITE LOCATION

FIGURE 1

N:\11174365.00000\DB\GIS\SitePlan.mxd 1/22/2008



URS	Route to the Hospital NYSDEC 315 N. Meadow Street Site Ithaca, Tomkins County, New York	Figure 2

TABLES

TABLE 1

JOB HAZARD ANALYSES

URS Corporation NYSDEC, NYSDEC 315 N. Meadow Street Site (#7-55-014), Ithaca, Tomkins County, NY	**DATE** **3/12/17**	☐ **NEW** ☒ **REVISED**	**PAGE 3 of 3**
WORK ACTIVITY (Description): **Groundwater Monitoring**			
DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY:	POSITION/TITLE
Jon Sundquist	Project Manager		HSE Representative
			RHSEM
Tim Ifkovich	Site Geologist		SSO
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENT(S)			
☒ REFLECTIVE VEST ☒ HARD HAT ☒ SAFETY GLASSES ☒ PPE CLOTHING Level D with long pants or as required by changing conditions as determined by SSO	☒ SAFETY SHOES Steel-toe ☐ HEARING PROTECTION Metatarsal protection for saw cutting, jack hammering, and pressure washing	☒ AIR PURIFYING RESPIRATOR required as specified in SMSs and determined by SSO	☒ GLOVES nitrile/leather as required by task-specific critical actions of JSA ☒ OTHER All PPE must be worn as specified in task-specific critical actions of JSA
JOB STEPS	**POTENTIAL HAZARDS**	**CRITICAL ACTIONS TO MITIGATE HAZARDS**	
Groundwater Sampling	Vehicular traffic	Reflective vests required	
		Use cones, caution tape, or other barricades as necessary	
		Be aware of traffic and site traffic patterns.	
	Chemical exposure to site contaminants (dermal and inhalation)	Use appropriate and calibrated monitoring equipment including: PID	
		Wear nitrile gloves (inner and outer), Tyvek and other PPE as necessary.	
		Adhere to action limits as specified in HASP	
	Hot/Cold Weather Exposure	Wear appropriate clothing	
		Take frequent warming breaks	
		Drink cool/hot liquids	
	Potential Electrical Hazards	If using extension cords and powered sampling equipment, check cords and equipment before use. Use portable GFCI.	
	Injury during lifting	Lift with knees	
		Ask for assistance with heavy objects	
		Keep back straight and do not twist	
	Manage contaminated purge water and materials	Keep generation of excess contaminated purge water and materials to a minimum and manage according to work plan.	

TABLE 2

CHEMICAL CONTAMINANTS OF CONCERN

Specific Contaminant Known or Suspected	PEL, or TLV (ppm)	IDLH (ppm)	Acute Effects	Ionization Potential (eV)	Appropriate Monitoring Instrument
VOCs (CAS number)	0.5 TLV 1.0 OSHA PEL		Human Carcinogen		
Tetrachloroethene (C) (127-18-4)	100	150	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage;	9.32	PID
Trichloroethylene (C) (79-01-6)	100	1,000	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	9.45	
1,1-Dichloroethene (C) (75-35-4)	NS	NS	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	10.00	
cis-1,2-Dichloroethene (156-59-2)	200	1,000	Irritation eyes, respiratory system; central nervous system depression	9.65	
trans-1,2-Dichloroethene (156-60-5)					
Vinyl Chloride (C)* (75-01-4)	1	NS	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	9.99	Draeger CMS

NOTES:

NS = No Standard
ppm = parts per million
eV = Electron Volt
PEL = Permissible Exposure Limit
REL = Regulatory Exposure Limit
TLV = Threshold Limit Value
IDLH = Immediately Dangerous to Life and Health
NA = Not Applicable
C = Carcinogen
*** = Even though vinyl chloride is a contaminant of concern, the highest concentration detected during the most recent groundwater monitoring event was 700 ppb, in a monitoring well located in the source area. Therefore, air monitoring for this compound is not necessary.**

ATTACHMENT A

SAFETY DATA SHEETS

(SDSs)

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NONFLAMMABLE GAS MIXTURE

Containing One or More of the Following Components in a Nitrogen Balance Gas: Oxygen 0-23.5%; Isobutylene, 0.0005-0.9%

SYNONYMS: Not Applicable
CHEMICAL FAMILY NAME: Not Applicable
FORMULA: Not Applicable
Document Number: 50054

Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). This MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product.

PRODUCT USE:	Calibration of Monitoring and Research Equipment
SUPPLIER/MANUFACTURER'S NAME:	CALGAZ, LLC
ADDRESS:	821 Chesapeake Drive Cambridge, MD 21613
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	1-410-228-6400
General MSDS Information:	1-713/868-0440
Fax on Demand:	1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		NIOSH	OTHER
			TWA ppm	STEL ppm	TWA ppm	STEL ppm	IDLH ppm	ppm
Isobutylene	115-11-7	0.0005-0.9%	There are no specific exposure limits for Isobutylene.					
Oxygen	7782-44-7	0-23.5%	There are no specific exposure limits for Oxygen.					
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established. See Section 16 for Definitions of Terms Used.
NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas mixture has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This is a colorless, odorless gas mixture. Releases of this gas mixture may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene, a component of this gas mixture, may cause drowsiness and other central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this gas mixture is by inhalation.

INHALATION: Due to the small size of an individual cylinder of this gas mixture, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. The chief health hazard associated with this gas mixture is when this gas mixture contains less than 19.5% Oxygen and is released in a small, poorly-ventilated area (i.e. an enclosed or confined space). Under this circumstance, an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The effects associated with various levels of oxygen are as follows:

CONCENTRATION OF OXYGEN	OBSERVED EFFECT
12-16% Oxygen:	Breathing and pulse rate increase, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea, vomiting, collapse, or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation In Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Due to the small size of the individual cylinder of this gas mixture, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. The most significant hazard associated with this gas mixture when it contains less than 19.5% oxygen is the potential for exposure to oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, unconsciousness, and death. The skin of a victim of over-exposure may have a blue color. Additionally, Isobutylene, a component of this gas mixture, may cause drowsiness or central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

CHRONIC: Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system.

TARGET ORGANS: ACUTE: Respiratory system, eyes. **CHRONIC:** Heart, cardiovascular system, central nervous system

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	1
FLAMMABILITY HAZARD	(RED)	0
PHYSICAL HAZARD	(YELLOW)	0

PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
See Section 8			

For Routine Industrial Use and Handling Applications

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn.

No unusual health effects are anticipated after exposure to this gas mixture, due to the small cylinder size. If any adverse symptom develops after over-exposure to this gas mixture, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to this gas mixture.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary, treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

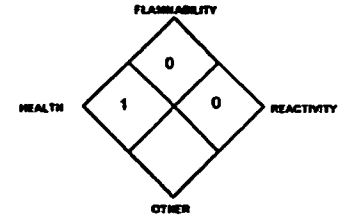
FIRE EXTINGUISHING MATERIALS: Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

NFPA RATING



6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Due to the small size and content of the cylinder, an accidental release of this gas mixture presents significantly less risk of an oxygen deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for oxygen. Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify the cylinders containing this gas mixture. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

STORAGE AND HANDLING PRACTICES: Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C [70°F]). Cylinders should be stored in dry, well-ventilated areas, away from sources of heat, ignition, and direct sunlight. Protect cylinders against physical damage. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. **WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.**

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: WARNING! Compressed gases can present significant safety hazards. During cylinder use, use equipment designed for these specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this gas mixture in well-ventilated areas. If this gas mixture is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of Nitrous Oxide and Oxygen.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection when oxygen levels are below 19.5%, or during emergency response to a release of this gas mixture. During an emergency situation, before entering the area, check the concentration of Methane and Oxygen. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Wear leather gloves when handling cylinders. Chemically resistant gloves should be worn when using this gas mixture. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: No special protection is needed under normal circumstances of use. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Nitrogen, a main component of this gas mixture.

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.072 lbs/ ft³ (1.153 kg/m³)
BOILING POINT: -195.8°C (-320.4°F)
FREEZING/MELTING POINT @ 10 psig: -210°C (-345.8°F)
SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906
pH: Not applicable
SOLUBILITY IN WATER vol/vol @ 32°F (0°C) and 1 atm: 0.023
MOLECULAR WEIGHT: 28.01
EVAPORATION RATE (nBuAc = 1): Not applicable.
EXPANSION RATIO: Not applicable.
ODOR THRESHOLD: Not applicable.
SPECIFIC VOLUME (ft³/lb): 13.8
VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

The following information is for Oxygen, a main component of this gas mixture.

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.083 lb/cu ft (1.326 kg/m³)
FREEZING/MELTING POINT @ 10 psig: -218.8°C (-361.8°F)
BOILING POINT: -183.0°C (-297.4°F)
SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 1.105
pH: Not applicable.
SOLUBILITY IN WATER vol/vol at 32°F (0°C) and 1 atm: 0.0491
MOLECULAR WEIGHT: 32.00
EVAPORATION RATE (nBuAc = 1): Not applicable.
EXPANSION RATIO: Not applicable.
ODOR THRESHOLD: Not applicable.
VOLUME (ft³/lb): 12.1
VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable

The following information is for the gas mixture.

APPEARANCE AND COLOR: This is a colorless, odorless gas mixture.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of this gas mixture. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.
DECOMPOSITION PRODUCTS: The thermal decomposition products of Isobutylene include carbon oxides. The other components of this gas mixture do not decompose, per se, but can react with other compounds in the heat of a fire.
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in the Nitrogen component of this gas mixture. Lithium reacts slowly with Nitrogen at ambient temperatures. The Isobutylene component of this gas mixture is also incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen difluoride, and nitrogen trifluoride).
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology data are available for the components of this gas mixture.
ISOBUTYLENE:
LC_{50} (inhalation, rat) = 620,000 mg/kg/4 hours
LC_{50} (inhalation, mouse) = 415,000 mg/kg
NITROGEN:
There are no specific toxicology data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the environment.
SUSPECTED CANCER AGENT: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.
IRRITANCY OF PRODUCT: Contact with rapidly expanding gases can be irritating to exposed skin and eyes.
SENSITIZATION TO THE PRODUCT: The components of this gas mixture are not known to cause human skin or respiratory sensitization.
REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this gas mixture and its components on the human reproductive system.
Mutagenicity: No mutagenicity effects have been described for the components in this gas mixture.
Embryotoxicity: No embryotoxic effects have been described for the components in this gas mixture.
Teratogenicity: No teratogenicity effects have been described for the components in this gas mixture.
Reproductive Toxicity: No reproductive toxicity effects have been described for the components in gas mixture.
A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.
BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for the components of this gas mixture.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: The components of this gas mixture occur naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this gas mixture.
OXYGEN: Water Solubility = 1 volume Oxygen/32 volumes water at 20°C. Log K_{ow} = -0.65
NITROGEN: Water Solubility = 2.4 volumes Nitrogen/100 volumes water at 0°C. 1.6 volumes Nitrogen/100 volumes water at 20°C.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on the effects of this gas mixture on plant and animal life.
EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on the effects of this gas mixture on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

14. TRANSPORTATION INFORMATION

THIS GAS MIXTURE IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Compressed gases, n.o.s. ("Oxygen, Nitrogen)"or the gas component with the next highest concentration next to Nitrogen.
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1956
PACKING GROUP: Not applicable.
DOT LABEL(S) REQUIRED: Class 2.2 (Non-Flammable Gas)
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126
MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).
SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.
Note: DOT 39 Cylinders ship in a strong outer carton (overpack). Pertinent shipping information goes on the outside of the overpack. DOT 39 Cylinders do not have transportation information on the cylinder itself.
TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas is considered as Dangerous Goods, per regulations of Transport Canada.
PROPER SHIPPING NAME: Compressed gases, n.o.s. ("Oxygen, Nitrogen)"or the gas component with the next highest concentration next to Nitrogen.
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1956
PACKING GROUP: Not Applicable
HAZARD LABEL: Class 2.2 (Non-Flammable Gas)
SPECIAL PROVISIONS: None
EXPLOSIVE LIMIT AND LIMITED QUANTITY INDEX: 0.12
ERAP INDEX: None
PASSENGER CARRYING SHIP INDEX: None
PASSENGER CARRYING ROAD VEHICLE OR PASSENGER CARRYING RAILWAY VEHICLE INDEX: 75
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126
NOTE: Shipment of compressed gas cylinders via Public Passenger Road Vehicle is a violation of Canadian law (Transport Canada Transportation of Dangerous Goods Act, 1992).

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:
U.S. SARA REPORTING REQUIREMENTS: The components of this gas mixture are not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.
U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this gas mixture. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.
U.S. TSCA INVENTORY STATUS: The components of this gas mixture are listed on the TSCA Inventory.
U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.
OTHER U.S. FEDERAL REGULATIONS:
- No component of this gas mixture is subject to the requirements of CFR 29 1910.1000 (under the 1989 PELs)
- Isobutylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds.
- The regulations of the Process Safety Management of Highly Hazardous Chemicals are not applicable (29 CFR 1910.119)
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR Part 82).

15. REGULATORY INFORMATION (continued)

- Nitrogen and Oxygen are not listed as Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Isobutylene is listed under this regulation in Table 3 as Regulated Substances (Flammable Substances), in quantities of 10,000 lbs (4,554 kg) or greater.

U.S. STATE REGULATORY INFORMATION: The components of this gas mixture are covered under the following specific State regulations:

Alaska - Designated Toxic and Hazardous Substances: No.
California - Permissible Exposure Limits for Chemical Contaminants: Nitrogen.
Florida - Substance List: Oxygen, Isobutylene.
Illinois - Toxic Substance List: No.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Oxygen, Isobutylene.
Michigan - Critical Materials Register: No.
Minnesota - List of Hazardous Substances: No.
Missouri - Employer Information/Toxic Substance List: No.
New Jersey - Right to Know Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.
Rhode Island - Hazardous Substance List: Oxygen, Nitrogen.
Texas - Hazardous Substance List: No.
West Virginia - Hazardous Substance List: No.
Wisconsin - Toxic and Hazardous Substances: : No.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this gas mixture is on the California Proposition 65 lists.

ADDITIONAL CANADIAN REGULATIONS:
CANADIAN DSL/NDSL INVENTORY STATUS: The components of this gas mixture are listed on the DSL Inventory.
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this gas mixture are not on the CEPA Priorities Substances Lists.
CANADIAN WHMIS REGULATIONS: This gas mixture is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

16. OTHER INFORMATION

INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. CALGAZ, LLC will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping cylinders involves some preparation before the metal dealer may accept them. We perform this operation as a service to valued customers who want to participate.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about the handling of compressed gases can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

P-1 *"Safe Handling of Compressed Gases in Containers"*
AV-1 *"Safe Handling and Storage of Compressed Gases"*
"Handbook of Compressed Gases"

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
619/670-0609
Fax on Demand: 1-800/231-1366

AIR LIQUIDE

Material Safety Data Sheet

MSDS ID NO.: 0117MAR019
Revision date: 07/25/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon No. 2 Low Sulfur Fuel Oil Dyed 500 ppm Sulfur Max
Synonym: No. 2 Fuel Oil Dyed (0.05% Sulfur Max); No. 2 Fuel Oil Dyed 0.05% Sulfur Max; No. 2 NR 500 Fuel Oil Dyed; Fuel Oil No. 2, Non-Road Use, Dyed
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

No. 2 Fuel Oil is a complex mixture of paraffins, cycloparaffins, olefins and aromatic hydrocarbons having hydrocarbon chain lengths predominantly in the range of C11 through C20. May contain a trace amount of benzene (<0.01%). Can contain small amounts of red dye and additives (<0.15%) which are not considered hazardous at the concentrations used.

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon No. 2 Fuel Oil Dyed (0.05% Sulfur Max)	68476-30-2	100	= 100 mg/m³ TWA vapor and aerosol, as total hydrocarbons skin - potential for cutaneous absorption (as total hydrocarbons)		

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Saturated Hydrocarbons	Mixture	54-85			
Aromatic Hydrocarbons	Mixture	15-45			
Unsaturated Hydrocarbons	Mixture	1-6			
Naphthalene	91-20-3	0.1-0.5	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

FUEL OIL IS A RED COLORED LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. PROLONGED OR REPEATED SKIN CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS.

OSHA WARNING LABEL:

WARNING.
COMBUSTIBLE LIQUID.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to high vapor concentrations may produce headache, giddiness, vertigo, and anesthetic stupor.

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Produces little or no irritation on direct contact with the eye.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon No. 2 Fuel Oil Dyed (0.05% Sulfur Max) 68476-30-2	NE		A3 - Animal Carcinogen (as total hydrocarbons)	

Notes: The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of diesel fuel/fuel oil in humans. IARC determined that there was limited evidence for the carcinogenicity of marine diesel fuel in animals. Distillate (light) diesel fuels were not classifiable as to their carcinogenicity to humans (Group 3A).

IARC has determined that there is sufficient evidence for the carcinogenicity in experimental animals of diesel engine exhaust and extracts of diesel engine exhaust particles. IARC determined that there is only limited evidence for the carcinogenicity in humans of diesel engine exhaust. However, IARC's overall evaluation has resulted in the IARC designation of diesel engine exhaust as probably carcinogenic to humans (Group 2A) because of the presence of certain engine exhaust components.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present

Notes: The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Keep surrounding area cool with water spray from a distance and prevent further ignition of combustible material. Keep run-off water out of sewers and water sources.

Flash point: 130-190 F
Autoignition temperature: 637 F
Flammable limits in air - lower (%): 0.7
Flammable limits in air - upper (%): 5.0

NFPA rating:
Health: 1
Flammability: 2

HMIS classification:
Health: 1
Flammability: 2

Reactivity: 1
Other: -

Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Avoid repeated and prolonged skin contact. Never siphon this product by mouth. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Respiratory protection: Use approved organic vapor chemical cartridge or supplied air respirators when material produces vapors that exceed permissible limits or excessive vapors are generated. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride and polyurethane gloves to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Red Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Red
Odor:	Slight Hydrocarbon
Molecular weight:	180
pH:	Neutral
Boiling point/range (5-95%):	400-640 F
Melting point/range:	No disponible.

Decomposition temperature:	Not applicable.
Specific gravity:	Not determined
Density:	6.76 lbs/gal
Bulk density:	No data available.
Vapor density:	4-5
Vapor pressure:	1-10 mm Hg @ 100 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	10%
Viscosity:	1.9-3.4 @ 40 C

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
Materials to avoid:	Strong oxidizers such as nitrates, perchlorates, chlorine, fluorine.
Conditions to avoid:	Excessive heat, sources of igition and open flames.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon No. 2 Fuel Oil Dyed (0.05% Sulfur Max)	68476-30-2	>2 mg/l for 4 hr [Dog]	>5 ml/kg [Rabbit]	9-16 ml/kg [Rat]

Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies. Some components of this product, have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the kidney damage develops via the formation of a alpha-2μ-globulin, a mechanism unique to the male rat. Humans do not form alpha-2μ-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in humans. Some components of this product were found to be positive in a few mutagenicity tests while negative in the majority of others. The exact relationship between these results and human health is not known.

Summary of health effect data on distillate fuel components:

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Oral administration of 133-267 mg/kg/day of naphthalene in mice for up to 90 days did not produce mortality, systemic toxicity, adversely affect organ or body weight or produce changes in blood. Repeated oral administration of naphthalene produced an anemia in dogs. Repeated intraperitoneal doses of naphthalene produced lung damage in mice. Repeated high doses of naphthalene has caused the formation of cataracts and retinotoxicity in the eyes of rats and rabbits due to accumulation of 1,2-naphthoquinone, a toxic metabolite. Effects in human eyes is uncertain and not well documented. Pregnant rats administered intraperitoneal doses of naphthalene during gestation gave birth to offspring that had delayed heart and bone development. Pregnant mice given near lethal doses of naphthalene showed no significant maternal toxicity and a reduction in the number of pups per litter, but no gross abnormalities in offspring. Suppressed spermatogenesis and progeny development have been reported in mice, rats and guinea pigs after exposure to high concentrations of naphthalene in their drinking water. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Summary of health effect information on diesel engine exhaust:

Chronic inhalation studies of whole diesel engine exhaust in mice and rats produced a significant increase in lung tumors. Combustion of kerosine and/or diesel fuels produces gases and particulates which include carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur and hydrocarbons. Significant exposure to carbon monoxide vapors decreases the oxygen carrying capacity of the blood and may cause tissue hypoxia via formation of carboxyhemoglobin.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects:

Product can cause fouling of shoreline and may be harmful to aquatic life in low concentrations. The 96 hour LL50 values for an accomadated fraction (WAF) of fuel oil ranged from 3.2 to 65 mg/l in fish and 2-210 mg/l in invertebrates. EL50 values for inhibition of algal growth ranged from 1.8 to 2.9 mg/l for No. 2 fuel oil and from 10 to 78 mg/l for diesel fuel. This product does not concentrate or accumulate in the food chain. If released to soil and water, this product is expected to biodegrade under both aerobic and anaerobic conditions.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations:

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "characteristic" hazardous waste. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Fuel Oil, No. 2
UN/Identification No:	NA 1993
Hazard Class:	3
Packing group:	III
DOT reportable quantity (lbs):	Not applicable.

TDG (Canada):

Proper shipping name:	Fuel Oil, No. 2
UN/Identification No:	NA 1993
Hazard Class:	3
Packing group:	III
Regulated substances:	Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Saturated Hydrocarbons	None
Aromatic Hydrocarbons	None
Unsaturated Hydrocarbons	None
Naphthalene	= 0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Saturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Aromatic Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Unsaturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.

Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Naphthalene	B4, D2A	1 %

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

Material Safety Data Sheet

MSDS ID NO.: 0127MAR019
Revision date: 07/20/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon Regular Unleaded Gasoline
Synonym: Conventional Regular Unleaded Gasoline
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Gasoline is a complex combination of hydrocarbons consisting of paraffins, cycloparaffins, aromatic and olefinic hydrocarbons having carbon numbers predominantly greater than C3 and boiling in the range of 85-500 F. Can contain small amounts of dye and other additives (>0.02%) which are not considered hazardous at the concentrations used.

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon Regular Unleaded Gasoline	86290-81-5	100	300 ppm TWA; 500 ppm STEL		

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Saturated Hydrocarbons	Mixture	55-85			
Aromatic Hydrocarbons	Mixture	10-40			
Unsaturated Hydrocarbons	Mixture	1-15			
Toluene	108-88-3	1-15	= 50 ppm TWA skin - potential for cutaneous absorption	= 100 ppm TWA = 150 ppm STEL = 375 mg/m³ TWA = 560 mg/m³ STEL	
Xylene	1330-20-7	2-10	= 100 ppm TWA = 150 ppm STEL	= 100 ppm TWA = 150 ppm STEL = 435 mg/m³ TWA = 655 mg/m³ STEL	
1,2,4-Trimethylbenzene	95-63-6	1-5	= 25 ppm TWA	= 125 mg/m³ TWA = 25 ppm TWA	
Benzene	71-43-2	0.5-3.5	= 0.5 ppm TWA = 2.5 ppm STEL skin - potential for cutaneous absorption	= 10 ppm TWA unless specified in 1910.1028 = 25 ppm Ceiling unless specified in 1910.1028 = 50 ppm STEL 10 min, unless specified in 1910.1028	OSHA Exposure Limit as specified in 1910.1028: =1.0 ppm TWA = 5 ppm STEL = 0.5 ppm Action Level
Hexane	110-54-3	0-3	= 1000 ppm STEL = 50 ppm TWA = 500 ppm TWA skin - potential for cutaneous absorption		
Ethyl Benzene	100-41-4	0.5-2.0	= 100 ppm TWA = 125 ppm STEL	= 100 ppm TWA = 125 ppm STEL = 435 mg/m³ TWA = 545 mg/m³ STEL	
Naphthalene	91-20-3	0.1-0.5	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

GASOLINE IS A CLEAR OR COLORED LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. THIS PRODUCT CONTAINS BENZENE WHICH MAY CAUSE CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS. CONTAINS MATERIAL THAT HAS CAUSED CANCER BASED ON ANIMAL DATA. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH.

OSHA WARNING LABEL:

DANGER!
EXTREMELY FLAMMABLE.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.
CONTAINS BENZENE WHICH MAY CAUSE CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS.
CONTAINS MATERIAL THAT HAS CAUSED CANCER BASED ON ANIMAL DATA.

CONSUMER WARNING LABEL:

GASOLINE HEALTH AND SAFETY WARNING STATEMENT:

EXTREMELY FLAMMABLE, VAPORS MAY EXPLODE.
HARMFUL OR FATAL IF SWALLOWED.
LONG TERM EXPOSURE TO VAPORS HAS CAUSED CANCER IN LABORATORY ANIMALS.
KEEP FACE AWAY FROM NOZZLE WHILE FILLING.
KEEP NOZZLE AWAY FROM EYES AND SKIN.
NEVER SIPHON BY MOUTH.
DON'T OVERFILL TANK.
FOR USE AS A MOTOR FUEL ONLY.

STATIC ELECTRICITY, SPARK EXPLOSION, ELECTRONIC DEVICES WARNING:

DO NOT GET BACK IN YOUR VEHICLE WHILE REFUELING.
RE-ENTRY COULD CAUSE STATIC ELECTRICITY BUILD UP.
USE APPROVED CONTAINER.
PUT CONTAINER ON GROUND (NEVER ON OR IN A VEHICLE).
KEEP NOZZLE IN CONTACT WITH CONTAINER.
KEEP CELLULAR PHONES OR OTHER DEVICES IN YOUR VEHICLE DURING REFUELING.

Inhalation:

Exposure to vapor concentrations of gasoline exceeding 1,000 ppm can cause respiratory irritation, headache, dizziness, nausea and loss of coordination. Higher concentrations may cause loss of consciousness, cardiac sensitization, coma and death resulting from respiratory failure.
Intentional overexposure to high concentrations of product vapors (such as huffing) can cause nervous system and brain damage, convulsions and sudden death from cardiac arrest.

Ingestion:

Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact:

Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Eye irritation may result from contact with the liquid or exposure to the vapor at concentrations above the TLV.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon Regular Unleaded Gasoline 86290-81-5	A2 - Possible Human Carcinogen		A3 - Animal Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of gasoline in humans. IARC determined that limited evidence of carcinogenicity in animals exists. IARC's overall evaluation of gasoline, in spite of limited carcinogenicity evidence, has resulted in the IARC designation of gasoline as possibly carcinogenic to humans (Group 2B) because gasoline contains benzene.

IARC has determined that there is inadequate evidence for the carcinogenicity of gasoline engine exhaust in humans or animals. However, IARC's overall evaluation on gasoline engine exhaust, in spite of the absence of carcinogenicity data, has resulted in the IARC designation of gasoline engine exhaust as possibly carcinogenic to humans (Group 2B) because of the presence of certain engine exhaust components.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Toluene 108-88-3			A4 - Not Classifiable as a Human Carcinogen	
Xylene 1330-20-7			A4 - Not Classifiable as a Human Carcinogen	
Benzene 71-43-2	Supplement 7, 1987; Monograph 29, 1982	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen	Present
Ethyl Benzene 100-41-4	Monograph 77, 2000		A3 - Animal Carcinogen	
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present

Notes: The International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), and OSHA have determined that there is sufficient evidence for the carcinogenicity of benzene in humans (Group 1A).

The International Agency for Research on Cancer (IARC) has concluded that ethyl benzene is possibly carcinogenic to humans (Group 2B).

The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion:	If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.
Eye contact:	Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.
Medical conditions aggravated by exposure:	Pre-existing eye, skin, respiratory, liver and/or kidney disorders may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media:	For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.
Specific hazards:	This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.
Special protective equipment for firefighters:	Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.
Flash point:	-50
Autoignition temperature:	CA 495 F
Flammable limits in air - lower (%):	1.4
Flammable limits in air - upper (%):	7.6

NFPA rating:	**HMIS classification:**
Health: 1	Health: 1
Flammability: 3	Flammability: 3
Reactivity: 0	Reactivity: 0
Other: -	Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:	Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

g:

with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding ling practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on ntainers since they may contain explosive residues. Avoid skin contact. Exercise good personal hygiene removal of soiled clothing and prompt washing with soap and water.

as a motor fuel only. Product should never be used as a solvent due to its flammable and potentially toxic s. Siphoning by mouth can result in lung aspiration which can be harmful or fatal.

containers of 12 gallons (45 liters) or less should never be filled while they are in or on a motor vehicle or marine atic electric discharge can ignite fuel vapors when filling non-grounded containers or vehicles on trailers. rs should be placed on the ground. The nozzle spout must be kept in contact with the container before and e entire filling operation. Use only approved containers. A buildup of static electricity can occur upon re-entry hicle during fueling especially in cold or dry climate conditions. The charge is generated by the action of r fabrics (i.e., clothing and upholstery) rubbing across each other as a person enters/exits the vehicle. A flash fire lt from this discharge if sufficient flammable vapors are present. Therefore, do not get back in your vehicle while . Cellular phones and other electronic devices may have the potential to emit electrical charges (sparks). Sparks ially explosive atmospheres (including fueling areas such as gas stations) could cause an explosion if sufficient le vapors are present. Therefore, turn off cellular phones and other electronic devices when working in ly explosive atmospheres or keep devices inside your vehicle during refueling.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

NAL PROTECTIVE EQUIPMENT

ring measures:	Local or general exhaust required in an enclosed area or when there is inadequate ventilation.
spiratory protection:	Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.
in and body protection:	Use nitrile rubber, viton or PVA gloves for repeated or prolonged skin exposure.
e protection:	No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.
giene measures:	No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

YSICAL AND CHEMICAL PROPERTIES

nce:	Clear Or Colored Liquid
l state (Solid/Liquid/Gas):	Liquid
ce type (Pure/Mixture):	Mixture
	Clear or Colored
	Strong Hydrocarbon
ar weight:	100
	Neutral
point/range (5-95%):	90-437 F
point/range:	Not determined.
osition temperature:	Not applicable.
gravity:	0.70-0.77

Density:	5.9-6.3 lbs/gal
Bulk density:	No data available.
Vapor density:	3-4
Vapor pressure:	Not determined.
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	2.13-4.5
VOC content(%):	100%
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
Materials to avoid:	Strong oxidizers such as nitrates, chlorates, peroxides.
Conditions to avoid:	Excessive heat, sources of ignition, open flame.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon Regular Unleaded Gasoline	86290-81-5	>10,000 ppm [Dog]	>5 ml/kg [Rabbit]	>14 ml/kg [Rat]

Lifetime inhalation studies with full vaporized gasoline (67, 292 and 2,056 ppm) produced kidney damage and kidney tumors in male rats but not in female rats or male and female mice. Female mice developed a slightly higher incidence of liver tumors compared to controls at the highest exposure level. Results from separate studies with compounds producing similar effects, i.e., 1,4-dichlorobenzene and perchloroethylene, have shown that the kidney damage and kidney tumors develop via the formation of alpha-2u-globulin, a mechanism unique to the male rat. Humans do not form alpha-2u-globulin, therefore, tumors resulting from this mechanism are not relevant in humans. The biologic significance of the mouse liver tumor response with regard to human health risk is questionable.

Summary of health effect information on gasoline engine exhaust:

Chronic inhalation studies of gasoline engine exhaust in mice, rats and hamsters did not produce any carcinogenic effects. Condensates/extracts of gasoline engine exhaust produced an increase in tumors compared to controls when testing by skin painting, subcutaneous injection, intratracheal instillation or implantation into the lungs. Combustion of gasoline produces gases and particulates which include carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur and hydrocarbons. Significant exposure to carbon monoxide vapors decreases the oxygen carrying capacity of the blood and may cause tissue hypoxia via formation of carboxyhemoglobin. Overexposure to CO can cause headache, nausea, nervous system depression, coma and death.

Summary of health effect data on gasoline components:

This product may contain benzene at a level of >0.1%. Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

This product contains >0.1% ethyl benzene (EB). Rats and mice exposed to 750 ppm EB for 6 hours/day, 5 days/week for two years developed kidney tumors in male and femmale rats and lung tumors in male mice and liver tumor in female mice.

This product contains>0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Oral administration of 133-267 mg/kg/day of naphthalene in mice for up to 90 days did not produce mortality, systemic toxicity, adversely affect organ or body weight or produce changes in blood. Repeated oral administration of naphthalene produced an anemia in dogs. Repeated intraperitoneal doses of naphthalene produced lung damage in mice. Repeated high doses of naphthalene has caused the formation of cataracts and retinotoxicity in the eyes of rats and rabbits due to accumulation of 1,2-naphthoquinone, a toxic metabolite. Effects in human eyes is uncertain and not well documented. Pregnant rats administered intraperitoneal doses of naphthalene during gestation gave birth to offspring that had delayed heart and bone development. Pregnant mice given near lethal doses of naphthalene showed no significant maternal toxicity and a reduction in the number of pups per litter, but no gross abnormalities in offspring. Suppressed spermatogenesis and progeny development have been reported in mice, rats and guinea pigs after exposure to high concentrations of naphthalene in their drinking water. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

This product may contain hexane at a level of >1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects:

Product can cause fouling of shoreline and may be harmful to aquatic life in low concentrations. This product does not concentrate or accumulate in the food chain.

The aquatic toxicity of gasoline is as follows:

FreshwaterToxicity:
LD50 is 8 ppm at 96 hours in bluegill.
TLM is 90 ppm at 24 hours in juvenile shad.

SaltwaterToxicity:
LC50 is 2 ppm at 96 hours in mullet.
LD50 is 1.5 ppm at 96 hours in grass shrimp.
LC50 is 2 ppm at 96 hours in menhaden.
TLM is 91 ppm at 24 hours in juvenile shad.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations:

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "characteristic" hazardous waste. This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Gasoline
UN/Identification No:	UN 1203
Hazard Class:	3
Packing group:	II
DOT reportable quantity (lbs):	Not applicable.

TDG (Canada):

Proper shipping name:	Gasoline
UN/Identification No:	UN 1203
Hazard Class:	3
Packing group:	II
Regulated substances:	Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Toluene	NA
Xylene	NA
1,2,4-Trimethylbenzene	NA
Benzene	NA
Hexane	NA
Ethyl Benzene	NA
Naphthalene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Toluene	= 0.454 kg final RQ = 1 lb final RQ = 10 lb final RQ = 100 lb final RQ = 1000 lb final RQ = 4.54 kg final RQ = 45.4 kg final RQ = 454 kg final RQ
Xylene	= 100 lb final RQ = 45.4 kg final RQ
1,2,4-Trimethylbenzene	NA
Benzene	= 0.454 kg final RQ = 0.454 kg statutory RQ = 1 lb final RQ = 1 lb statutory RQ = 10 lb final RQ = 10 lb final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 100 lb final RQ = 4.54 kg final RQ = 4.54 kg final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 45.4 kg final RQ
Hexane	= 2270 kg final RQ = 5000 lb final RQ
Ethyl Benzene	= 100 lb final RQ = 1000 lb final RQ = 45.4 kg final RQ = 454 kg final RQ
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Saturated Hydrocarbons	None
Aromatic Hydrocarbons	None
Unsaturated Hydrocarbons	None
Toluene	= 1.0 percent de minimis concentration
Xylene	= 1.0 percent de minimis concentration
1,2,4-Trimethylbenzene	= 1.0 percent de minimis concentration
Benzene	= 0.1 percent de minimis concentration
Hexane	= 1.0 percent de minimis concentration
Ethyl Benzene	= 0.1 percent de minimis concentration
Naphthalene	= 0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Saturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Aromatic Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Unsaturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Toluene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	developmental toxicity; initial date 1/1/91
New Jersey Right-To-Know:	sn 1866
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 1866
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Xylene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 2014
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Annual usage threshold = 100 pounds (all isomers)
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree

New Jersey - Environmental Hazardous Substances List:	SN 2014
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

1,2,4-Trimethylbenzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 1929 sn 2716
Pennsylvania Right-To-Know:	[present] environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	SN 2716
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 2/27/87 developmental toxicity; initial date 12/26/97 male reproductive toxicity; initial date 12/26/97
New Jersey Right-To-Know:	sn 0197
Pennsylvania Right-To-Know:	environmental hazard; special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable, Carcinogen; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	carcinogen; flammable - third degree; mutagen
New Jersey - Environmental Hazardous Substances List:	SN 0197
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 10 lbs Air RQ

Hexane

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed

Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Ethyl Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 0851
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0851
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Toluene	B2; D2A	1% (English Item 1578, French Item 1622)
Xylene	B2; D2A; D2B	
1,2,4-Trimethylbenzene	B3	0.1% (English Item 1640, French Item 1684) 1% (English Item 1638, French Item 1682)
Benzene	B2; D2A	0.1% (English Item 153, French Item 277)
Ethyl Benzene	B2; D2A; D2B	0.1% (English Item 697, French Item 854)
Naphthalene	B4, D2A	1 %

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

MSDS SUMMARY SHEET

Manufacturer:
Name: PHILLIPS PETROLEUM COMPANY
Address 1:
Address 2:
Address 3:
CSZ: BARTLESVILLE **State:** OK **Zipcode:** 74004
Emergency phone: (800) 424-9300
Business phone: 800-762-0942

Product:

Ferndale MSDS#: 1354 **Version # :** 6
Manufacturer MSDS#: 0041
Current? : 2002
Name:

NO. 2 DIESEL FUEL

Synonyms:

CARB **Diesel** TF3
CARB **Diesel**
CARB **Diesel** 10%
Diesel Fuel Oil
EPA Low Sulfur **Diesel** Fuel
EPA Low Sulfur **Diesel** Fuel – Dyed
EPA Off Road High Sulfur **Diesel** – Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 **Diesel** Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur **Diesel** – Dyed
No. 2 Low Sulfur **Diesel** - Dyed
No. 2 Low Sulfur **Diesel** - Undyed
Crude column 3rd IR
Crude column 3rd side cut
Atmospheric tower 3rd side cut
Ultra Low Sulfur **Diesel** No. 2
Finished **Diesel**
DHT Reactor Feed
Straight Run **Diesel**
Diesel
Middle Distillate

Product/Catalog Numbers:
MSDS Date: 01/01/2002 **(received:** 01/14/2002)

NFPA codes:
Health: 0 **Flammability:** 2 **Reactivity:** 0

MATERIAL SAFETY DATA SHEET
No. 2 Diesel Fuel

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: No. 2 Diesel Fuel
Product Code: Multiple
SAP Code:
Synonyms: 1354
CARB Diesel TF3
CARB Diesel
CARB Diesel 10%
Diesel Fuel Oil
EPA Low Sulfur Diesel Fuel
EPA Low Sulfur Diesel Fuel – Dyed
EPA Off Road High Sulfur Diesel – Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 Diesel Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur Diesel – Dyed
No. 2 Low Sulfur Diesel - Dyed
No. 2 Low Sulfur Diesel – Undyed
No. 2 Ultra Low Sulfur Diesel – Dyed
No. 2 Ultra Low Sulfur Diesel - Undyed
Intended Use: Fuel
Chemical Family:
Responsible Party: Phillip's Petroleum Company
Bartlesville, Oklahoma 74004
For Additional MSDSs: 800-762-0942
Technical Information:

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:
Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: 800-356-3120

Health Hazards/Precautionary Measures: Causes severe skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Flammable liquid and vapor. Keep away from heat, sparks, flames, static electricity or other sources of ignition.

Appearance: Straw-colored to dyed red
Physical Form: Liquid
Odor: Characteristic petroleum

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Immediately remove contaminated shoes, clothing, and constrictive jewelry and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek immediate medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek immediate medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard; Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

5. FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: >125°F/>52°
OSHA Flammability Class: Combustible liquid
LEL %: 0.3 / UEL %; 10.0
Autoignition Temperature: 500°F/260°C

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharged. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing or high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSIZ49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentration below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with an organic vapor cartridge maybe used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrants a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

Eyes/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse. It is recommended that impervious clothing be worn when skin contact is possible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1atm).

Appearance: Straw-colored to dyed red
Physical State: Liquid
Odor: Characteristic petroleum
pH: unavailable
Vapor Pressure (mm Hg): 0.40
Vapor Densisty (air=1):>3
Boiling Point/Range: 320-700°F /160-371°C
Freezing/Melting Point: No Data
Solubility in Water: Negligible
Specific Gravity: 0.81-0.88 @ 60°F
Percent Volatile: Negligible
Evaporation Rate (nBuAc=1): <1
Viscosity: 32.6-40.0 SUS @ 100°F
Bulk Density: 7.08 lbs/gal
Flash Point: >125°F / >52°C
Flammable/Expolsive Limits (%): LEL: 0.3 / UEL: 10.0

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc.

Hazardous Decomposition Products: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels. ACGIH has included a TLV of 0.05 mg/m3 TWA for diesel exhaust particulate on its 1999 Notice of Intended Changes. See Section 11 for additional information on hazards of engine exhaust.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Diesel Fuel No. 2 (CAS# 68476-34-6)

Carcinogenicity: Chronic dermal application of certain middle distillate streams contained in diesel fuel No. 2 resulted in an increased incidence of skin tumors in mice. This material has not been identified as carcinogen by NTP, IARC, or OSHA. Diesel exhaust is a probable cancer hazard based on tests with laboratory animals.

Target Organ(s): Limited evidence of renal impairment has been noted from a few case reports involving excessive exposure to diesel fuel No. 2.

Naphthalene (CAS# 91-20-3)

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has not been identified as a carcinogen by IARC or OSHA.

12. ECOLOGICAL INFORMATION

Not evaluated at this time

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001) and benzene (D018). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restrictions in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent then the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container ?insate? could be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller containers, consult with state and local regulations and disposal authorities.

14. TRANSPORT INFORMATION

DOT Shipping Description: Diesel Fuel, NA1983
Non-Bulk Package Marking: Diesel Fuel, 3, NA 1993, III

15. REGULATORY INFORMATION

EPA SARA 311/312 (Title III Hazard Categories):

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

SARA 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Component	CAS Number	Weight %
-- None known --		

California Proposition 65:

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

Component	Effect
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant

Diesel engine exhaust, while not a component of this material, is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

Carcinogen Identification:

This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any. Diesel exhaust is a probable cancer hazard based on tests in laboratory animals. It has been identified as carcinogen by IARC.

EPA (CERCLA Reportable Quantity: None

16. OTHER INFORMATION

Issue Date: 01/01/02
Previous Issue Date: 05/15/01
Product Code: Multiple
Revised Sections: None
Previous Product Code: Multiple
MSDS Number: 0041

Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Data Safety Sheet is based on data believed to be accurate as of the date this Material Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THE PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Tosco Refining Company ***Ferndale Refinery***

UltraLow Sulfur Diesel Product Specification

Ferndale Product Code:34380xx (5) Product Code: ULSD2

(COMETS)

Specification	Unit	Limit	Test Procedure	Typical
Appearance				
Water & Sediment	Vol %	0.05 Max	D 2709	
Color	Number	3.0 Max	D 1500	
Haze Rating	Rating	2 Max	D 4176	
Composition				
Carbon Residue (Ramsbottom)	Wt %	0.35 Max	D 524, D 189	
Volatility				
90% Recovered	Deg; F	540 Min	D 86	
	Deg; F	640 Min	D 86	
Flash Point	Deg; F	125 Min (1)	D 93	130 F
Gravity	API	30 Min	D 287, D4052	
Fluidity				
Pour Point	Deg; F	See Season Table (6)	D 97	
Cloud Point	Deg; F	See Season Table (6)	D 2500	10 F
Viscosity @ 104F	cSt	1.9 Min	D 445	
	cSt	4.1 Max	D 445	
Lubricity, SLBOCLE	grams	3100 Min	D 6078	3300gm
Lubricity, HFRR	mm	.45	D 6079	
Combustion				
Cetane Index or Cetane Number (3,4)	Number	40.0 Min	D 976, D613	47.0
Corrosion				
Copper Strip, 3hr @ 50 deg C	Number	3 Max (2)	D 130	
Aromatics (4)	Vol %	35 Max	D 1319	25 %
Contaminants				
Total Sulfur	PPM	30 Max	D 2622, D4294	15-20ppm
Water & Sediment	Vol %	0.05 Max	D 1796	
Ash	Wt %	0.01 Max	D 482	
Additives				
Cetane Improver	Lb/MBbl	675 Max		
Dye		Undyed		

1. Minimum release specification is 125 deg. F. The refinery should target 135 deg. F.
2. Test result reported as a number and letter (e.g. 1a). Any letter is allowable as long as the number meets the spec shown.
3. Either specification must be met.
4. Either cetane index minimum or aromatics maximum must be met.
5. Winter cloud and pour specifications may be relaxed to the summer specifications by agreement with the customer.
6. Season Table

Month	Product Code	Pour Point	Cloud Point
Jan, Feb, Nov, Dec	WI	0 max (5)	14 max (5)
Mar - Oct	SU	15 max	24 max

MATERIAL SAFETY DATA SHEET (MSDS)

24 HOUR EMERGENCY PHONE: CHEMTREC 1-800-424-9300

Effective Date: Sept. 1, 2004 / Supersedes: Jan. 1, 2000 / PAGE 1 OF 2

JBS INDUSTRIES

2550 Henkle Drive - Lebanon, Ohio 45036

TELEPHONE: 1-888-745-0720

SECTION 1 PRODUCT & COMPANY IDENTIFICATION

PRODUCT NAME: CITRUSOLVE M-2 PRODUCT NUMBER: IJ-400

PRODUCT DESCRIPTION: CITRUS SOLVENT DEGREASER

MANUFACTURER: JBS Industries
2550 Henkle Drive
Lebanon, Ohio 45036

PHONE: 888-745-0720
FAX: 513-228-2810

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	EFFECT	CAS#	PERCENT
CITRUS TERPENE	SKIN & EYE IRRITANT	5989-27-5	0-70
2-BUTOXYETHANOL	EYE IRRITANT	111-76-2	0-5
QUATERNARY AMINE/MIXTURE	CORROSIVE TO EYES	61789-77-3	0-25

HAZARDOUS INGREDIENTS:	EXPOSURE LIMITS OF INGREDIENTS	
	OSHA PEL	ACGIH TLV
CITRUS TERPENE	NOT ESTABLISHED	NOT ESTABLISHED
2-BUTOXYETHANOL	25 ppm (SKIN)	25 ppm (SKIN)
QUATERNARY AMINE/MIXTURE	400 ppm	400 ppm

SECTION 3 HAZARDS IDENTIFICATION

>>>>>>>>>>>>>>>>>>>>EMERGENCY OVERVIEW<<<<<<<<<<<<<<<<<<

CAN BE CORROSIVE TO EYES. INHALATION OF MISTS MAY BE IRRITATING TO THROAT AND RESPIRATORY TRACT. MAY CAUSE IRRITATION TO SKIN WITH PROLONGED EXPOSURE.

>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

SECTION 4 FIRST AID MEASURES

EYES: FLUSH EYES WITH LARGE QUANTITIES OF WATER, HOLDING EYELIDS OPEN FOR AT LEAST 15 MINUTES. GET IMMEDIATE MEDICAL ATTENTION.

SKIN: REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. SEEK MEDICAL ATTENTION IF IRRITATION PERSISTS.

INGESTION: GIVE WATER IF CONSCIOUS. DO NOT INDUCE VOMITING, ALTHOUGH VOMITING MAY OCCUR NATUARALLY. GET IMMEDIATE MEDICAL ATTENTION.

INHALATION: MOVE TO FRESH AIR. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION.

SECTION 5 FIRE FIGHTING MEASURES

FLASH POINT: 110 F **Flammable Limits:** Not Determined

Flammability: COMBUSTIBLE

Fire Hazard: Combustible liquid and vapor. Keep away from heat, sparks and flame.

Fire-Fighting Procedures: Use alcohol foam, water spray or fog. Cool closed containers exposed to fire with water. Fire- fighters should wear proper protective equipment.

SECTION 6 ACCIDENTAL RELEASE MEASURES

SPILLS & LEAKS: SMALL SPILLS: RINSE TO DRAIN.
LARGE SPILLS: CONTAIN FOR RECLAMATION OR DISPOSAL.

CAUTION: SPILLS OF THIS MATERIAL MAY CAUSE FLOOR TO BECOME SLIPPERY.

SECTION 7 HANDLING & STORAGE

PRODUCT SHOULD BE STORED IN ORIGINAL CONTAINERS AT TEMPERATURES BELOW 120 DEGREES F.
PRODUCT SHELF LIFE IS APPROXIMATELY 6 MONTHS.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYES: WEAR CHEMICAL GOGGLES.

SKIN: SOLVENT PROOF GLOVES. RUBBER APRON IF GREATER EXPOSURE IS LIKELY.

RESPIRATORY: GOOD GENERAL VENTILATION. RESPIRATOR NOT NORMALLY REQUIRED.

SECTION 9 PHYSICAL & CHEMICAL PROPERTIES

APPEARANCE & ODOR:	THIN AMBER LIQUID WITH CHARACTERISTIC CITRUS ODOR.		
SOLUBILITY IN WATER:	EMULSIIES IN WATER		
VAPOR PRESSURE:	0.3 kPa (1.9 mmHg) (at 20 C)	BOILING POINT:	170 C (338 F)
VAPOR DENSITY:	4.7 (Air=1)	SPECIFIC GRAVITY:	0.85 (Water=1)
PH FULL STRENGTH:	n/a		

SECTION 10 STABILITY & REACTIVITY

STABILITY: THIS IS A STABLE MATERIAL.
CONDITIONS TO AVOID: NONE KNOWN.
MATERIALS TO AVOID: STRONG OXIDIZING AGENTS.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

SECTION 11 TOXICOLOGICAL INFORMATION

NO DATA AVAILABLE ON THIS MIXTURE. FOR INFORMATION ON INGREDIENTS, WRITE TO THE ADDRESS LISTED IN SECTION 1 OF THIS MSDS.

SECTION 12 ECOLOGICAL INFORMATION

NO DATA AVAILABLE ON THIS MIXTURE. ALL SURFACTANT COMPONENTS ARE BIODEGRADABLE. THIS PRODUCT DOES NOT CONTAIN PHOSPHATES.

SECTION 13 DISPOSAL CONSIDERATIONS

FOLLOW ALL FEDERAL, STATE, AND LOCAL REGULATIONS APPROPRIATE FOR THIS MATERIAL.

SECTION 14 TRANSPORTATION INFORMATION

D.O.T. HAZARDOUS MATERIAL CLASS: NOT A D.O.T. HAZARDOUS MATERIAL.
UN NUMBER: NOT APPLICABLE NA NUMBER: NOT APPLICABLE

SECTION 15 REGULATORY INFORMATION

THIS MATERIAL IS NOT SARA TITLE III REPORTABLE.

SECTION 16 OTHER INFORMATION

HAZARD RATINGS PROVIDED FOR USE BY TRAINED INDIVIDUALS ONLY.
HMIS RATINGS (0=MINIMAL, 1=SLIGHT, 2=MODERATE, 3=SERIOUS, 4=SEVERE HAZARD)
FOR CONCENTRATE: HEALTH: 1 FLAMMABILITY: 2 REACTIVITY: 0

NFPA RATINGS (0=MINIMAL, 1=SLIGHT, 2=MODERATE, 3=SERIOUS, 4=SEVERE HAZARD)
FOR CONCENTRATE: HEALTH: 1 FLAMMABILITY: 2 REACTIVITY: 0

ALCONOX MSDS

Section 1: PRODUCT INFORMATION

Chemical family: Detergent.

Product name: Alconox

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Supplier: Same as manufacturer.

TDG classification: Not regulated.

WHMIS classification:

D2B

DSL status: The supplier has certified that all substances in this product appear on the domestic substances list.

Supplier MSDS date: 2005/03/09

Section 2: HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE

7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A: ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3: PHYSICAL DATA

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): Not applicable.

By weight: Not available.

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

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water\oil dist.: Not available.

VOC: None

Section 4: FIRE & EXPLOSION DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature:	Not available.
Flash point (°C), method:	None
Lower flammability limit (% vol):	Not applicable.
Upper flammability limit (% vol):	Not applicable.
Explosion Data	
Sensitivity to static discharge:	Not available.
Sensitivity to mechanical impact:	Not applicable.
Hazardous combustion products:	Oxides of carbon (COx). Hydrocarbons.
Explosive power:	None

Section 5: REACTIVITY DATA

Chemical stability:	Stable under normal conditions.
Conditions of instability:	None known.
Hazardous polymerization:	Will not occur.
Incompatible substances:	Strong acids. Strong oxidizers.
Hazardous decomposition products:	See hazardous combustion products.

Section 6: TOXICOLOGICAL PROPERTIES

Route of entry:	Skin contact, eye contact, inhalation and ingestion.
Effects of acute exposure	
Eye contact:	May cause irritation.
Skin contact:	Prolonged contact may cause irritation.
Inhalation:	Airborne particles may cause irritation.
Ingestion:	May cause vomiting and diarrhea. May cause abdominal pain. May cause gastric distress.
Effects of chronic exposure:	Contains an ingredient which may be corrosive.
LD50 of product, species & route:	> 5000 mg/kg rat oral.
LC50 of product, species & route:	Not available for mixture, see the ingredients section.
Exposure limit of material:	Not available for mixture, see the ingredients section.
Sensitization to product:	Not available.
Carcinogenic effects:	Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

Section 7: PREVENTATIVE MEASURES

Precautionary Measures

Gloves/Type:

Neoprene or rubber gloves.

Respiratory/Type:

If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye/Type:

Safety glasses with side-shields.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Leak/Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

TDG classification: Not regulated.

Special shipping information: Not regulated.

Section 8: FIRST AID MEASURES

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
Seek medical attention if symptoms persist.

Ingestion: Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Additional information: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any inaccuracies.

Section 9: ADDITIONAL INFORMATION

General note: This material safety data sheet was prepared from information obtained from various sources, including product suppliers and the Canadian Center for Occupational Health and Safety.

MSDS Number: **T0767** * * * * * *Effective Date:* ***08/16/05*** * * * * * *Supercedes:* ***05/08/03***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TETRACHLOROETHYLENE

1. Product Identification

Synonyms: ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride
CAS No.: 127-18-4
Molecular Weight: 165.83
Chemical Formula: Cl2C:CCl2
Product Codes:
J.T. Baker: 9218, 9360, 9453, 9465, 9469
Mallinckrodt: 1933, 8058

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Tetrachloroethylene	127-18-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.
Ingestion:
Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

---

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.
Explosion:
Not considered to be an explosion hazard. Containers may explode when involved in a fire.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.
Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (ceiling),
300 ppm/5min/3-hour (max)

-ACGIH Threshold Limit Value (TLV):
25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.
Odor:
Ethereal odor.
Solubility:
0.015 g in 100 g of water.
Specific Gravity:
1.62 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
121C (250F)
Melting Point:
-19C (-2F)
Vapor Density (Air=1):
5.7
Vapor Pressure (mm Hg):
18 @ 25C (77F)
Evaporation Rate (BuAc=1):
0.33 (trichloroethylene = 1)

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.
Conditions to Avoid:
Moisture, light, heat and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 4100 ppm/6H; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Tetrachloroethylene (127-18-4)	No	Yes	2A

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this

material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:

The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Tetrachloroethylene (127-18-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Tetrachloroethylene (127-18-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Tetrachloroethylene (127-18-4)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)

Tetrachloroethylene (127-18-4)	100	U210	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

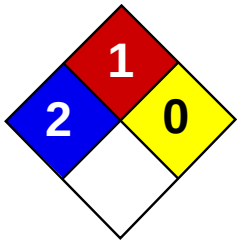
---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3, 11.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)



Material Safety Data Sheet
Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C2HCl3

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
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. 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:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

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. Seek medical attention.

Ingestion:
Do not induce vomiting. 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: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

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

Fire Hazards in Presence of Various Substances: Not available.

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

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

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste 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. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/

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

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

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: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m3) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

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

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

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

Solubility:
Easily soluble in methanol, 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: Not available.

Incompatibility with various substances: Not available.

Corrosivity:
Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

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

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene 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: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

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

Other Classifications:

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

DSCL (EEC):
R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

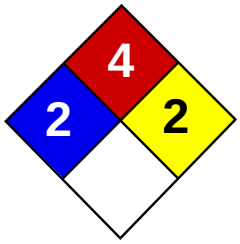
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:54 PM

Last Updated: 11/01/2010 12:00 PM

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



Health	2
Fire	4
Reactivity	0
Personal Protection	G

Material Safety Data Sheet
Vinylidene Chloride MSDS

Section 1: Chemical Product and Company Identification

Product Name: Vinylidene Chloride

Catalog Codes: SLV1063

CAS#: 75-35-4

RTECS: KV9275000

TSCA: TSCA 8(b) inventory: Vinylidene Chloride

CI#: Not available.

Synonym: 1,1-Dichloroethylene

Chemical Name: Vinylidene Chloride

Chemical Formula: C2-H2-Cl2

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
Vinylidene Chloride	75-35-4	100

Toxicological Data on Ingredients: Vinylidene Chloride: ORAL (LD50): Acute: 194 mg/kg [Mouse]. 200 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant). Slightly hazardous in case of eye contact (irritant), of inhalation (lung irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified 4 (No evidence.) by NTP. 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: Classified Reproductive system/toxin/female [POSSIBLE]. The substance may be toxic to kidneys, liver, bladder, gastrointestinal tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

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

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:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 520°C (968°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 8.4% UPPER: 16.5%

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

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

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

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. Poisonous 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 get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call

for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

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

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). Do not store above 25°C (77°F).

Section 8: Exposure Controls/Personal Protection

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

Personal Protection:
Safety glasses. 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:
STEL: 20 (ppm) from ACGIH (TLV) [United States] TWA: 1 from OSHA (PEL) [United States] TWA: 2 (ppm) [Austria] TWA: 5 (ppm) [Belgium] TWA: 5 (ppm) [Denmark] TWA: 2 (ppm) [Germany] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Chloroform-like (Slight.)

Taste: Not available.

Molecular Weight: 96.94 g/mole

Color: Colorless.

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

Boiling Point: 31°C (87.8°F)

Melting Point: -122.5°C (-188.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.213 (Water = 1)

Vapor Pressure: 78.8 kPa (@ 20°C)

Vapor Density: 3.25 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Very slightly dispersed in cold water, hot water, diethyl ether, acetone.

Solubility: Very slightly soluble in cold water, hot water, diethyl ether, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

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

Corrosivity: Corrosive in presence of steel.

Special Remarks on Reactivity:
Do not mix with Aluminum or Copper. May cause polymerization when exposed to Nitric Acid, Chlorosulfonic Acid, Oleum

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 194 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 4 (No evidence.) by NTP. A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. May cause damage to the following organs: kidneys, liver, bladder, gastrointestinal tract, skin, central nervous system (CNS).

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

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: 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 as toxic as the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Vinylidene chloride, Inhibited UNNA: 1303 PG: I

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Vinylidene Chloride Florida: Vinylidene Chloride Minnesota: Vinylidene Chloride Michigan critical material: Vinylidene Chloride Massachusetts RTK: Vinylidene Chloride New Jersey: Vinylidene Chloride TSCA 8(b) inventory: Vinylidene Chloride TSCA 8(a) PAIR: Vinylidene Chloride TSCA 8(d) H and S data reporting: Vinylidene Chloride: 8/4/95 CERCLA: Hazardous substances.: Vinylidene Chloride: 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-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

DSCL (EEC):
R12- Extremely flammable. R20- Harmful by inhalation. R40- Possible risks of irreversible effects.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 4

Reactivity: 0

Personal Protection: g

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

Health: 2

Flammability: 4

Reactivity: 2

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. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 12:15 AM

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

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

Material Safety Data Sheet

cis-1,2-Dichloroethylene, 97%

ACC# 97773

Section 1 - Chemical Product and Company Identification

MSDS Name: cis-1,2-Dichloroethylene, 97%
Catalog Numbers: AC113380000, AC113380025, AC113380100
Synonyms: cis-Acetylene dichloride.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
156-59-2	cis-1,2-Dichloroethylene	97	205-859-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes moderate eye irritation.
Skin: Causes moderate skin irritation. May cause dermatitis.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.
Chronic: Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

Section 4 - First Aid Measures

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

difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 6 deg C (42.80 deg F)
Autoignition Temperature: 440 deg C (824.00 deg F)
Explosion Limits, Lower:9.70 vol %
Upper: 12.80 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
cis-1,2-Dichloroethylene	200 ppm TWA	none listed	none listed

OSHA Vacated PELs: cis-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear
Odor: Pleasant odor
pH: Not available.
Vapor Pressure: 201 mm Hg @ 25 deg C
Vapor Density: 3.34 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 60 deg C @ 760 mm Hg
Freezing/Melting Point:-80 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:1.2800
Molecular Formula:C2H2Cl2
Molecular Weight:96.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
Conditions to Avoid: Light, ignition sources, exposure to air, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, copper.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 156-59-2: KV9420000
LD50/LC50:
CAS# 156-59-2:
Inhalation, rat: LC50 = 13700 ppm;
.

Carcinogenicity:
CAS# 156-59-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

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

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	1,2-DICHLOROETHYLENE
Hazard Class:		3
UN Number:		UN1150
Packing Group:		II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 156-59-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE

CAS# 156-59-2 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

California Prop 65

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

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN F

Risk Phrases:

R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger / Protection)

CAS# 156-59-2: No information available.

Canada - DSL / NDSL

CAS# 156-59-2 is listed on Canada's NDSL List.

Canada - WHMIS

WHMIS: Not available.

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

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 2/09/1998
Revision #5 Date: 3/16/2007

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

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: TRANS-1,2-DICHLOROETHYLENE

TRADE NAMES/SYNONYMS:
MTG MSDS 196; TRANS-ACETYLENE DICHLORIDE; TRANS-DICHLOROETHYLENE; TRANS-1,2-DICHLOROETHENE; 1,2-DICHLOROETHYLENE; RCRA U079; C2H2CL2; MAT23670; RTECS KV9400000

CHEMICAL FAMILY: halogenated, aliphatic

CREATION DATE: Jan 24 1989
REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TRANS-1,2-DICHLOROETHYLENE
CAS NUMBER: 156-60-5
PERCENTAGE: 100.0

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=2

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: liquid
ODOR: pleasant odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression
PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire. May react on contact with air, heat, light or water.

POTENTIAL HEALTH EFFECTS:

INHALATION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting, drowsiness, symptoms of drunkenness
LONG TERM EXPOSURE: no information on significant adverse effects
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
INGESTION:
SHORT TERM EXPOSURE: symptoms of drunkenness
LONG TERM EXPOSURE: no information on significant adverse effects

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

NOTE TO PHYSICIAN: For ingestion, consider gastric lavage. Consider oxygen.

5. FIRE FIGHTING MEASURES

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

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any

discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Water may be ineffective.

FLASH POINT: 36 F (2 C) (CC)
LOWER FLAMMABLE LIMIT: 9.7%
UPPER FLAMMABLE LIMIT: 12.8%
AUTOIGNITION: 860 F (460 C)
FLAMMABILITY CLASS (OSHA): IB

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TRANS-1,2-DICHLOROETHYLENE:
1,2-DICHLOROETHYLENE (ALL ISOMERS):
200 ppm (790 mg/m3) OSHA TWA
200 ppm ACGIH TWA
200 ppm (790 mg/m3) NIOSH recommended TWA 10 hour(s)

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye

wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
2000 ppm
Any supplied-air respirator operated in a continuous-flow mode.
Any powered, air-purifying respirator with organic vapor cartridge(s).
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
Emergency or planned entry into unknown concentrations or IDLH conditions -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: colorless
ODOR: pleasant odor
MOLECULAR WEIGHT: 96.94
MOLECULAR FORMULA: C2-H2-CL2
BOILING POINT: 118 F (48 C)
FREEZING POINT: -58 F (-50 C)
VAPOR PRESSURE: 400 mmHg @ 31 C
VAPOR DENSITY (air=1): 3.34
SPECIFIC GRAVITY (water=1): 1.2565
WATER SOLUBILITY: slightly soluble

PH: Not available
VOLATILITY: Not available
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: ethanol, ether

10. STABILITY AND REACTIVITY

REACTIVITY: May decompose on contact with air, light, moisture, heat or storage and use above room temperature. Releases toxic, corrosive, flammable or explosive gases.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: bases, metals, combustible materials, oxidizing materials, acids

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: phosgene, halogenated compounds, oxides of carbon

POLYMERIZATION: May polymerize. Avoid contact with incompatible materials.

11. TOXICOLOGICAL INFORMATION

TRANS-1,2-DICHLOROETHYLENE:
IRRITATION DATA: 500 mg/24 hour(s) skin-rabbit moderate; 10 mg eyes-rabbit moderate
TOXICITY DATA: 24100 ppm inhalation-rat LC50; >5 gm/kg skin-rabbit LD50; 1235 mg/kg oral-rat LD50
LOCAL EFFECTS:
Irritant: inhalation, skin, eye
ACUTE TOXICITY LEVEL:
Moderately Toxic: ingestion
Slightly Toxic: inhalation
TARGET ORGANS: central nervous system
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: respiratory disorders
MUTAGENIC DATA: Available.
REPRODUCTIVE EFFECTS DATA: Available.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
INVERTEBRATE TOXICITY: <110000 ug/L 48 hour(s) (Mortality) Water flea (Daphnia magna)

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U079.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Trichlorobenzenes, liquid
ID NUMBER: UN2321
HAZARD CLASS OR DIVISION: 6.1
PACKING GROUP: III
LABELING REQUIREMENTS: 6.1

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Trichlorobenzenes, liquid
UN NUMBER: UN2321
CLASS: 6.1
PACKING GROUP/CATEGORY: III

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):
ACUTE: Yes
CHRONIC: No
FIRE: Yes
REACTIVE: Yes
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
1,2-DICHLOROETHYLENE (ALL ISOMERS)

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE, WHETHER COMPENSATORY, CONSEQUENTIAL, EXEMPLARY, OR OTHERWISE, RESULTING FROM ANY PUBLICATION, USE OR RELIANCE UPON THE INFORMATION HEREIN.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: VINYL CHLORIDE

TRADE NAMES/SYNONYMS:
MTG MSDS 97; 1-CHLOROETHYLENE; 1-CHLOROETHENE; CHLOROETHYLENE; CHLOROETHENE; CHLORETHENE; CHLORETHYLENE; ETHYLENE MONOCHLORIDE; MONOCHLOROETHYLENE; MONOCHLORO ETHENE; MONOCHLOROETHENE; VINYL CHLORIDE MONOMER; VINYL CHLORIDE, INHIBITED; VINYL C MONOMER; RCRA U043; UN 1086; C2H3Cl; MAT24940; RTECS KU9625000

CHEMICAL FAMILY: halogenated, aliphatic

CREATION DATE: Jan 24 1989
REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: VINYL CHLORIDE
CAS NUMBER: 75-01-4
PERCENTAGE: >99.9

COMPONENT: PHENOL
CAS NUMBER: 108-95-2
PERCENTAGE: <0.1

COMPONENT: INHIBITORS
CAS NUMBER: Not assigned.
PERCENTAGE: <0.1

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=4 REACTIVITY=1

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: gas
ODOR: faint odor, sweet odor
MAJOR HEALTH HAZARDS: harmful if swallowed, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans)
PHYSICAL HAZARDS: Flammable gas. May cause flash fire. May polymerize. Containers may rupture or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, nausea, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, joint pain, loss of coordination, hearing loss, lung congestion
LONG TERM EXPOSURE: impotence, bluish skin color, blood disorders, liver damage, cancer
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation, blisters
LONG TERM EXPOSURE: irritation, blisters
EYE CONTACT:
SHORT TERM EXPOSURE: irritation, eye damage
LONG TERM EXPOSURE: irritation, eye damage
INGESTION:
SHORT TERM EXPOSURE: frostbite
LONG TERM EXPOSURE: cancer

4. FIRST AID MEASURES

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

SKIN CONTACT: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

EYE CONTACT: Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

INGESTION: If a large amount is swallowed, get medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Severe explosion hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables. Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 500 meters (1/3 mile). Consider downwind evacuation if material is leaking.

FLASH POINT: -108 F (-78 C) (CC)
LOWER FLAMMABLE LIMIT: 3.6%
UPPER FLAMMABLE LIMIT: 33%
AUTOIGNITION: 882 F (472 C)

6. ACCIDENTAL RELEASE MEASURES

WATER RELEASE:
Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Keep unnecessary people away, isolate hazard area and deny entry. Remove sources of ignition. Ventilate closed spaces before entering. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Inside storage: Store in a cool, dry place. Store in a

well-ventilated area. Avoid heat, flames, sparks and other sources of ignition. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. See original container for storage recommendations. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
VINYL CHLORIDE:
1.0 ppm OSHA TWA
5 ppm OSHA STEL 15 minute(s)
0.5 ppm OSHA action level 8 hour(s)
1 ppm ACGIH TWA
NIOSH TWA (lowest feasible concentration)

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: For the gas: Wear appropriate chemical resistant gloves. For the liquid: Wear insulated gloves.
OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1017.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
OSHA Standard:
Respirator selection should comply with 29 CFR 1910.134, 29 CFR 1910.1017, and the final rule published in the Federal Register on August 24, 2006.
NIOSH Recommendations:
At any detectable concentration -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.
Any appropriate escape-type, self-contained breathing apparatus.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
COLOR: colorless
ODOR: faint odor, sweet odor
MOLECULAR WEIGHT: 62.50
MOLECULAR FORMULA: C-H2-C-H-Cl
BOILING POINT: 9 F (-13 C)
FREEZING POINT: -245 F (-154 C)
VAPOR PRESSURE: 2515.6 mmHg @ 21.1 C
VAPOR DENSITY (air=1): 2.2
SPECIFIC GRAVITY (water=1): 0.9106
WATER SOLUBILITY: 0.25%
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: 260 ppm
EVAPORATION RATE: Not applicable
VISCOSITY: 0.01072 cP @ 20 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable
SOLVENT SOLUBILITY:
Soluble: alcohol, ether, carbon tetrachloride, benzene

10. STABILITY AND REACTIVITY

REACTIVITY: May polymerize. Avoid contact with light or storage and use above room temperature.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES: metal carbide, metals, oxidizing materials, peroxides

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: halogenated compounds, oxides of carbon, phosgene

POLYMERIZATION: May polymerize. Avoid contact with heat, light, air, water or incompatible materials. Closed containers may rupture violently.

11. TOXICOLOGICAL INFORMATION

VINYL CHLORIDE:
TOXICITY DATA: 18 pph/15 minute(s) inhalation-rat LC50; 500 mg/kg oral-rat LD50
CARCINOGEN STATUS: OSHA: Carcinogen; NTP: Known Human Carcinogen; IARC: Human Sufficient Evidence, Animal Sufficient Evidence, Group 1; ACGIH: A1 -Confirmed Human Carcinogen;

EC: Category 1
LOCAL EFFECTS:
Irritant: skin, eye
ACUTE TOXICITY LEVEL:
Toxic: ingestion
Relatively Non-toxic: inhalation
TARGET ORGANS: central nervous system
TUMORIGENIC DATA: Available.
MUTAGENIC DATA: Available.
REPRODUCTIVE EFFECTS DATA: Available.
ADDITIONAL DATA: Stimulants such as epinephrine may induce ventricular fibrillation. May cause birth defects.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 388000 ug/L 10 month(s) LETH (Mortality) Northern pike (Esox lucius)

INVERTEBRATE TOXICITY: 41.74 ug/L 72 day(s) (Residue) Mosquito (Culex pipiens quinquefasciata)

ALGAL TOXICITY: 41.74 ug/L 72 day(s) (Residue) Green algae (Oedogonium cardiacum)

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Hazardous Waste Number(s): D043. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.2 mg/L. U043.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Vinyl chloride, stabilized
ID NUMBER: UN1086
HAZARD CLASS OR DIVISION: 2.1
LABELING REQUIREMENTS: 2.1
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: 150 kg

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Vinyl chloride, stabilized
UN NUMBER: UN1086
CLASS: 2.1

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
Vinyl chloride: 1 LBS RQ
PHENOL: 1000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):
ACUTE: Yes
CHRONIC: Yes
FIRE: Yes
REACTIVE: Yes
SUDDEN RELEASE: Yes

SARA TITLE III SECTION 313 (40 CFR 372.65):
Vinyl chloride

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following:
Vinyl chloride
Cancer (Feb 27, 1987)

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: ABD2

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

ATTACHMENT B

REAL-TIME MONITORING INSTRUMENTATION

SPECIFICATION SHEETS

MiniRAE 3000

Portable Handheld VOC Monitor

The MiniRAE 3000 is the most advanced handheld volatile organic compound (VOC) monitor on the market. Its photoionization detector's (PID) extended range of **0 to 15,000 ppm** makes it an ideal instrument for applications from industrial hygiene to leak detection and HazMat.

The **RF modem allows real-time data transmissions** with a base controller located up to 500 feet away from the MiniRAE 3000 (or two miles with optional RAELink3 portable modem). A personal computer can be used as the base station for a MiniRAE 3000 system. The standard ProRAE Remote software is capable of monitoring the input of up to 64 remotely located monitors, including MiniRAE 3000, AreaRAE, etc.

Wireless

AutoRAE Compatible

Key Features

- **Proven PID technology**
  The patented sensor provides the following unique features:
  - 3-second response time
  - Extended range up to 15,000 ppm with improved linearity
  - Humidity compensation with integral humidity and temperature sensors
- **Real-time wireless** data transmission with built-in RF modem or Bluetooth
- **Designed for simple service** Easy access to lamp and sensor in seconds without tools
- **Big graphic display** for easy overview of gas type, Correction Factor and concentration
- **Field-interchangeable battery pack** replaced in seconds without tools
- **Integrated flashlight** for better view in dark conditions
- **User-friendly screens, including dataplot chart view**
- **Integrated RAE Systems Correction Factors list for more than 200 compounds** to measure more chemicals than any other PID
- **Multi-language support** with 12 languages encoded
- **Rugged housing** withstands use in harsh environments
  - IP67 waterproof design for easy cleaning and decontamination in water
  - Strong protective removable rubber boot

Additional Advantages

- View real-time sensor data and alarm status at headquarters or command center
- Automatic lamp type recognition
- Duty-cycling™ lamp and sensor auto-cleaning technology
- Tough, flexible inlet Flexi-Probe™
- 3 large keys operable with 3 layers of gloves
- Strong, built-in sample pump draws up to 100 feet (30m) horizontally or vertically
- Loud, 95dB audible alarm
- Bright red flashing visual alarm
- Interchangeable drop-in Lithium-Ion and alkaline battery packs
- Charging cradle doubles as an external battery charger
- Compatible with AutoRAE™ calibration station
- ProRAE Remote software simultaneously controls and displays readings for up to 64 remote detectors
- License-free, ISM band RF transmission with communication range up to 500 feet (2 miles with optional RAELink3 modem)
- Optional RAELink3 modem provides GPS capability to track and display readings from remote detectors and provide up to 2 miles' long-distance transmission
- Datalogging with up to 6 months of data at one-minute intervals
- 3-year 10.6 eV lamp warranty

Specifications*

Detector Specifications

Size	10" L x 3.0" W x 2.5" H (25.5 cm x 7.6 cm x 6.4 cm)
Weight	26 oz (738 g)
Sensors	Photoionization sensor with standard 10.6 eV or optional 9.8 eV or 11.7 eV lamps
Battery	• Rechargeable, external field-replaceable Lithium-Ion battery pack • Alkaline battery adapter
Operating Hours	16 hours of operation (12 hours with alkaline battery)
Display Graphic	4 lines, 28 x 43 mm, with LED backlight for enhanced display readability
Keypad	1 operation and 2 programming keys, 1 flashlight on/off
Direct Readout	Instantaneous reading • VOCs as ppm by volume • High values • STEL and TWA • Battery and shutdown voltage • Date, time, temperature
Alarms	95dB at 12" (30 cm) buzzer and flashing red LED to indicate exceeded preset limits • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Alarms latching with manual override or automatic reset • Additional diagnostic alarm and display message for low battery and pump stall
EMI/RFI	Highly resistant to EMI/RFI. Compliant with EMC directive (2004/108/EC); R & TTE directive (1999/5/EC)
IP Rating	• IP67 unit off and without flexible probe • IP65 unit running
Datalogging	Standard 6 months at one-minute intervals
Calibration	Two-point or three-point calibration for zero and span. Calibration memory for 8 calibration gases, alarm limits, span values and calibration dates
Sampling Pump	• Internal, integrated flow rate at 500 cc/mn • Sample from 100' (30m) horizontally and vertically
Low Flow Alarm	• Auto pump shutoff at low-flow condition
Communication	• Download data and upload instrument set-up from PC through charging cradle or optional Bluetooth™ • Wireless data transmission through built-in RF modem
Frequency	902 to 928 MHz (license-free), 2.400 to 2.4835 GHz (license-free), 433 MHz, 869 MHz
RF Range	Up to 500' (152m; 900 MHz, 433 Mhz, 869 Mhz), extendable with RAELink3 Repeater to 2 miles (3.2km)
Hazard Area Approval	• **US and Canada:** c SP us, Classified as Intrinsically Safe for use in Class I, Division 1 Groups A, B, C, D • **Europe:** ATEX II 2G EEx ia IIC T4
Temperature	-4° to 122° F (-20° to 50° C)
Humidity	0% to 95% relative humidity (non-condensing)
Attachments	Durable bright yellow rubber boot
Warranty	3 years for 10.6 eV lamp, 1 year for pump, battery, sensor and instrument

*Specifications are subject to change

Sensor Specifications

Gas Monitor	Range	Resolution	Response Time T90
VOCs	0 to 999.9 ppm 1000 to 15,000 ppm	0.1 ppm 1 ppm	< 3 s < 3 s

Monitor only includes:

- MiniRAE 3000 Monitor, Model PGM-7320
- Wireless communication module built in, as specified
- Datalogging with ProRAE Studio Package for Windows™ 98, 2000, NT, ME & XP
- Charging/download adapter
- RAE UV lamp, as specified
- Flex-I-Probe™
- External filter
- Rubber boot
- Alkaline battery adapter
- Lamp-cleaning kit
- Tool kit
- Operation CD-ROM
- Operation & Maintenance manual
- Soft leather case

Monitor with accessories kit adds:

- Hard transport case with pre-cut foam padding
- Charging/download cradle
- 5 Porous metal filters and O-rings
- Organic vapor zeroing kit
- Gas outlet port adapter and tubing

Optional calibration kit adds:

- 100 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

Optional Guaranteed Cost of Ownership Program:

- 4-year repair and replacement guarantee
- Annual maintenance service

RAE Systems Inc.
3775 North First Street
San Jose, CA 95134 USA
raesales@raesystems.com

USA/Canada 1-877-723-2878
Europe/Russia +45 8652 5155
Middle East/Australia +971 4 3639 427
China +86 10 58858788
Asia +852 2669 0828

www.raesystems.com

Dräger CMS

The world's only Chip Measurement System (CMS) makes spot measurements as easy as 1, 2, 3: insert chip – start measurement – read measurement result on the LCD display. The Dräger CMS combines the advantages of the Dräger-Tubes® with those of an optoelectronic analysis system. Two components define the system: the analyser and the substance-specific chip.

Dräger CMS:
Highly accurate and easy to use.

Dräger CMS Chip:
Miniaturised Dräger-Tubes.

Simple to use

The Dräger CMS is ready for use after only a brief instruction. It makes no difference which gas or vapour you wish to measure – the instrument is used in the same way every time. The operation is guided by a menu on the display and a single button/switch. The display can be backlit and is available in German, English, French or Spanish. After an automatic system self-test, the analyser is powered up and the measurement system is immediately ready for operation. Simply insert the chip, perform the measurement and read the measurement result displayed as a concentration on the screen. At the end of the measurement, the chip is automatically ejected from the instrument, and the analyser shuts down. An audible signal sounds after each operating step. Power is supplied by four standard and easily replaceable batteries which are especially suited to the analyser's requirements (see technical data). The battery capacity allows for more than seven hours of measurement and is, of course, always displayed on the screen.

Accurate

The principle of mass current measurement ensures that the instrument remains unaffected by fluctuations in air pressure. Because the chips are calibrated before leaving the factory, there is no need for the user to calibrate the Dräger CMS. Any possible temperature and humidity effects are checked during factory calibration. The analyser is explosion protected and certified in accordance with Cenelec (Europe), UL (USA) and UL/CSA (Canada). In addition, the system is protected against dust and splash water in accordance with IP 54, and is resistant to electromagnetic waves.

Dräger safety

Remote-System

To allow measurements at places which are difficult to access, a remote system is available. This comprises of an additional pump and extension hose, and is connected to the back of the analyser.

Because the remote system is activated by its own switch, the system can remain attached to the analyser. A telescopic probe can also be attached to the Remote-System.

Dot matrix display:
For clear legible concentrations and menu navigation

Main control element:
For easy and safe operation

Carrying strap:
Allowing the instrument to be carried safely, even when the user is wearing gloves

Dräger CMS Chip:
Suitable for 10 measurements of one gas. Automatically supplies the analyser with the calibration data and measurement range of the respective gas

ORDER INFORMATION

Description	Order no.
Analyser set, comprising of: analyser with integrated DataRecorder, batteries	64 05 300
Remote-System for measurement in hard to reach places, incl. 3 m hose	64 05 060
Telescopic probe (1 m)	83 16 530
Extension set (3 m)	83 17 614
Extension set (10 m)	83 17 613
Analyser Remote (Analyser with integrated Remote-System)	83 17 700
Odorant test set	83 18 030

DRÄGER CMS CHIPS

Description	Measurement range	Order no.
Acetic Acid	2 - 50 ppm	64 06 330
Acetone	40 - 600 ppm	64 06 470
Ammonia	0.2 - 5 ppm	64 06 550
Ammonia	2 - 50 ppm	64 06 130
Ammonia	10 - 150 ppm	64 06 020
Ammonia	100 - 2000 ppm	64 06 570
Benzene	50 - 2500 ppb	64 06 600
Benzene	0.2 - 10 ppm	64 06 030
Benzene	0.5 - 10 ppm	64 06 160
Benzene	10 - 250 ppm	64 06 280
Butadiene	1 - 25 ppm	64 06 460
Carbon Dioxide	200 - 3000 ppm	64 06 190
Carbon Dioxide	1000 - 25000 ppm	64 06 070
Carbon Dioxide	1 - 20 Vol.-%	64 06 210
Carbon Monoxide	5 - 150 ppm	64 06 080
Chlorine	0.2 - 10 ppm	64 06 010
Ethanol	100 - 2500 ppm	64 06 370
Ethylene Oxide	0.4 - 5 ppm	64 06 580
Formaldehyde	0.2 - 5 ppm	64 06 540
Gasodor™ S-Free™	5 - 30 mg/m³	64 06 590
Hydrocyanic Acid	2 - 50 ppm	64 06 100
Hydrochloric Acid	1 - 25 ppm	64 06 090
Hydrochloric Acid	20 - 500 ppm	64 06 140
Hydrogen Peroxide	0.2 - 2 ppm	64 06 440
Hydrogen Sulphide	0.2 - 5 ppm	64 06 520
Hydrogen Sulphide	2 - 50 ppm	64 06 050
Hydrogen Sulphide	20 - 500 ppm	64 06 150
Hydrogen Sulphide	100 - 2500 ppm	64 06 220
Mercaptan	0.25 - 6 ppm	64 06 360
Methanol	20 - 500 ppm	64 06 380
Methylene Chloride	20 - 200 ppm	64 06 510
MTBE	10 - 200 ppm	64 06 530
Nirogen Dioxide	0.5 - 25 ppm	64 06 120
Nitrous Fumes	0.5 - 15 ppm	64 06 060
Nitrous Fumes	10 - 200 ppm	64 06 240
Ozone	25 - 1000 ppb	64 06 430
Oxygen	1 - 30 Vol.-%	64 06 490
o-Xylene	10 - 300 ppm	64 06 260
Petroleum Hydrocarbons	20 - 500 ppm	64 06 200
Petroleum Hydrocarbons	100 - 3000 ppm	64 06 270
Perchloroethylene	5 - 150 ppm	64 06 040
Phosgene	0.05 - 2 ppm	64 06 340
Phosphine	0.1 - 2.5 ppm	64 06 400
Phosphine	1 - 25 ppm	64 06 410
Phosphine	20 - 500 ppm	64 06 420
Phosphine	200 - 5000 ppm	64 06 500
Propane	100 - 2000 ppm	64 06 310
i-Propanol	40 - 1000 ppm	64 06 390
Sulphur Dioxide	0.4 - 10 ppm	64 06 110
Sulphur Dioxide	5 - 150 ppm	64 06 180
Styrene	2 - 40 ppm	64 06 560
Toluene	10 - 300 ppm	64 06 250
Trichlorethylene	5 - 100 ppm	64 06 320
Vinyl Chloride	0.3 - 10 ppm	64 06 170
Vinyl Chloride	10 - 250 ppm	64 06 230
Water Vapour	0.4 - 10 mg/L	64 06 450
Training Chip	Simulation	64 06 290

Dräger CMS:
Spot measurement at industrial workplaces.

Dräger CMS with Remote-System:
Measurement with extension hoses of up to 10 m in length.

TECHNICAL DATA

Measurement range and resolution	Depends on chip type used - please see chip list	
Typical measurement time	30 s to 5 min in range of the limit values, depends on chip type and concentration of hazardous substance	
Ready for measurement	Immediately	
Poisoning effects	Not possible	
Calibration	Not necessary	
Temperature during operation	0 to 40°C	
Temperature during storage	-20 to +60°C (analyser)	
	< 25°C (chips)	
Air pressure	700 to 1100 hPa	
Humidity	0 to 95% relative humidity, non-condensing	
Recording of measured values	Six-fold optics and light conductor system, remission measurement	
System diagnosis	Automatic, with microcontroller for all system components	
Display	LCD, alphanumeric with backlighting	
Menu languages	English, German, French, Spanish	
Operating time	Approx. 450 minutes of measurement	
Power supply	Varta	LR 6 4006
4 x 1.5 V batteries from the following types:	Energizer	LR 6 E 91
	Panasonic	LR 6 AM 3 AA MN 1500
	Alkaline/foil	(PMBC)
Weight	730 g (analyser with batteries)	
Dimensions (LxWxH)	215 mm x 105 mm x 65 mm	
Approvals	BVS Europe type examination certificate,	
	protection class EEx ib II CT4, test no.	
	BVS 95.D.2109	
	UL USA	Class 1, Div. 1, Groups A, B, C, D, Temp. Code T4, 2P91
	UL Canada	Class 1, Div. 1, Groups A, B, C, D, Temp. Code T4, 2P91
	CSA Canada	Class 1, Div. 1, Groups A, B, C, D, Exia, Temp. Code T4
Protection class	IP 54 dust and splash protection	

90 44 337 | PI | 048 | CR-PR-ED | Marketing Communications | Printed in Germany | chlorine free - ecological | subject to modification!

SUBSIDIARIES

AUSTRALIA
Draeger Safety Pacific Pty. Ltd.
Axxess Corporate Park
Mt. Waverley. Vic 3149
Tel +61 3 92 65 50 00
Fax +61 3 92 65 50 95

CANADA
Draeger Canada Ltd.
7555 Danbro Crescent
Mississauga, Ontario L5N 6P9
Tel +1 905 821 8988
Fax +1 905 821 2565

P. R. CHINA
Beijing Fortune Draeger
Safety Equipment Co., Ltd.
Beijing 101300
Tel +86 10 80 49 80 00
Fax +86 10 80 49 80 05

FRANCE
Dräger Safety France S.A.S.
3c, Route de la Fédération
67025 Strasbourg Cedex
Tel +33 388 40 76 76
Fax +33 388 40 76 67

MEXICO
Draeger Safety S.A. de C.V.
Av. Peñuelas No. 5
Querétaro, Qro México
Tel +52 442 246 1113
Fax +52 442 246 1114

NETHERLANDS
Dräger Safety Nederland B.V.
Edisonstraat 53
2700 AH Zoetermeer
Tel +31 79 344 46 66
Fax +31 79 344 47 90

SINGAPORE
Draeger Safety Asia Pte. Ltd.
67 Ayer Rajah Crescent # 06 03
139950 Singapore
Tel +65 68 72 92 88
Fax +65 67 73 20 33

REP. OF SOUTH AFRICA
Dräger South Africa (Pty) Ltd.
P.O.Box 68601
Bryanston 2021
Tel +27 11 465 99 59
Fax +27 11 465 69 53

SPAIN
Draeger Safety Hispania S.A.
Calle Xaudaró 5
28034 Madrid
Tel +34 91 728 34 00
Fax +34 91 729 48 99

UNITED KINGDOM
Draeger Safety UK Ltd.
Blyth Riverside Business Park
Blyth, Northumberland NE24 4RG
Tel +44 1670 352 891
Fax +44 1670 356 266

USA
Draeger Safety, Inc.
101 Technology Drive
Pittsburgh, PA 15275
Tel +1 412 787 8383
Fax +1 412 787 2207

Dräger Safety AG & Co. KGaA
Revalstrasse 1
23560 Luebeck, Germany
Tel +49 451 882 0
Fax +49 451 882 2080
www.draeger.com

APPENDIX F – QUALITY ASSURANCE PROJECT PLAN

315 NORTH MEADOW STREET SITE

CITY OF ITHACA

TOMPKINS COUNTY, NEW YORK

NYSDEC SITE NUMBER: 755014

QUALITY ASSURANCE PROJECT PLAN

Prepared For:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

625 Broadway

Albany, New York 12233

Prepared By:

URS CORPORATION

257 West Genesee Street, Suite 400

Buffalo, New York 14202-2657

AUGUST 2015

TABLE OF CONTENTS

QUALITY ASSURANCE PROJECT PLAN

Page No.

TABLES

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is designed to provide an overview of quality assurance/quality control (QA/QC) procedures and programs which will be adhered to during the post-remediation long-term monitoring activities, as described in the Site Management Plan (SMP) (URS, 2015) under New York State Department of Environmental Conservation (NYSDEC) Work Assignment (WA) #D004433-28. The QAPP will identify specific methods and QA/QC procedures for chemically testing environmental samples collected from the 315 North Meadow Street Site, located in the City of Ithaca, Tompkins County, New York (NYSDEC Site Number: 755014).

2.0 PROJECT/SITE DESCRIPTION

A complete project description of the 315 North Meadow Street site is provided in Section 2.0 of the 315 North Meadow Street Site Management Plan (URS, 2015).

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The Project QA Officer is responsible for verifying that corporate QA procedures are followed and will ensure that all project deliverables undergo a thorough QA review by senior staff members who are qualified and experienced in appropriate disciplines.

The Project Manager will be responsible for technical and financial management of the project, and for overall coordination and review of component work activities. The Project Manager will serve as the initial and primary contact with the client throughout the project and will be responsible for successful implementation of the field QA/QC activities. The Project Manager may delegate a portion of the tasks required for successful implementation of the work plans to a qualified individual who will be on site during the investigation (e.g., the Onsite Environmental Scientist). This person will work under the direction of the Project Manager and will be responsible for implementing applicable QC procedures in the field and verifying that all other field personnel adhere to these procedures and perform all activities as described in the project work plans.

The onsite Environmental Scientist is responsible for verifying that QA procedures are followed in the field so that valid, representative samples are collected. The onsite Environmental Scientist also will be responsible for coordinating the activities of all personnel involved with implementing the project in the field, and will be in daily communication with the Project Manager. This person will verify that all field work is carried out in accordance with the approved project plans.

The Project Chemist is responsible for verifying that the analytical laboratory adheres to the QA/QC requirements specified in this QAPP. The Project Chemist will be the point-of- contact for the Laboratory Project Manager and will be in continual contact to verify that all efforts are being made to perform sample analyses in a manner such that the resulting data will be of sufficient quality for its intended purpose.

The analytical laboratory to be used for the analysis of groundwater samples shall hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. The QA Manager of the laboratory will be responsible for performing project-specific audits and for overseeing the quality control data generated. Also, the Laboratory Project Manager will be in daily communication with the Project Chemist.

4.0 DATA QUALITY OBJECTIVES

4.1 Background

Data quality objectives (DQOs) are qualitative and quantitative statements, which specify the quality of data required to support the post-remediation activities at the 315 North Meadow Street site. The project DQOs focus on the identification of the end use of the data to be collected. The project DQOs will be achieved utilizing definitive data categories, as outlined in *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, EPA/240/B-06/001, USEPA (February 2006). The definitive data are generated using rigorous analytical methods, such as approved United States Environmental Protection Agency (USEPA) reference methods. The analytical methods to be used are presented in Table 4-1.

The project DQOs for data collected during the site management of 315 North Meadow Street activities are to:

- Evaluate the effectiveness of the post-remediation activities for the remediation of contaminated groundwater at the site.
- Perform annual sampling and analysis of groundwater samples.
- Sample quantitation limits for groundwater must not exceed NYSDEC, Division of Water Technical and Operational Guidance Series (TOGS 1.1.1), *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*, June 1998, as listed on Table 4-2.

4.2 QA Objectives For Chemical Data Measurement

For the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) will be measured during offsite chemical analysis.

4.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate (MS/MSD) and field duplicate samples, which not only provide a measure of sampling and analytical precision, but also indicate analytical precision through the reproducibility of the analytical results. Relative percent difference (RPD) is used to evaluate precision. RPD criteria for all analyses being performed as part of this work assignment shall meet method-specific QC requirements.

4.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. Sampling accuracy may be assessed by evaluating the results of rinse and trip blanks. These data help to assess the potential contamination contribution from various outside sources. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the MS/MSD and laboratory control sample (LCS)/matrix spike blank (MSB). The MS/MSD analyses, which will give an indication of matrix effects that may be affecting target compounds, are also a good gauge of method efficiency. Surrogate recovery results will also be measured. Acceptable for all analyses being performed as part of this work assignment shall meet method-specific QC requirements.

4.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter, which is most concerned

with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures, as described in Sections 2.0, 3.0, and 4.0 of the 315 North Meadow Street Field Sampling and Analysis Plan (FSAP) have been selected with the goal of obtaining representative samples for the media of concern.

4.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. An objective for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, and completeness), because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that the analytical methods and procedures be explicitly followed.

4.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. To meet project needs, it is important that appropriate QC procedures be maintained to verify that valid data are obtained. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, then NYSDEC and contractor project personnel will determine whether the deviations may cause the data to be rejected, and what further actions, if any, need to be taken.

4.2.6 Sensitivity

Sensitivity, as it pertains to analytical methods/instrumentation, is defined as the lowest concentration that can be distinguished from background noise. Sensitivity is measured by method detection limit (MDL) determinations, which are performed by laboratories for each analyte and matrix following procedures specified in 40 CFR Part 136, Appendix B. The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. MDLs are determined by the laboratory on an annual basis.

Analytical results are typically reported down to the quantitation limit (QL), which represents the lowest point of the calibration curve, and are typically 3-10 times higher than MDLs. Analytical results reported above the MDL but below the QL are considered estimated values (qualified "J"). QLs for the parameters to be analyzed as part of this work assignment, where applicable, are presented in Table 4-2.

5.0 SAMPLING LOCATIONS AND PROCEDURES

Sampling locations and procedures are discussed in Sections 4.0 of the 315 North Meadow Street FSAP (URS, 2015).

6.0 SAMPLE CUSTODY AND HOLDING TIMES

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in these investigations will follow the chain-of-custody guidelines of *NEIC Policies and Procedures*, prepared by the National Enforcement Investigations Center (NEIC) of the USEPA Office of Enforcement.

6.1 Custody Definitions

- Chain-of-Custody Officer - The employee responsible for oversight of all associated chain-of-custody activities is the Onsite Geologist (or his/her designee).
- Under Custody - A sample is "Under Custody" if:
  - It is in one's possession, or
  - It is in one's view, after being in one's possession, or
  - It was in one's possession and one locked it up, or
  - It is in a designated secure area.

6.2 Responsibilities

The onsite Environmental Scientist will be responsible for monitoring all chain-of-custody activities and for collecting legally admissible chain-of-custody documentation for the permanent project file. The onsite Environmental Scientist will be responsible for:

- Initially reviewing sample labels or tags, closure tapes, and chain-of-custody record forms. The onsite Environmental Scientist shall document this review for the project file.

- Training all field sampling personnel in the methodologies for carrying out chain-of-custody and the proper use of all chain-of-custody forms and record documents.

- Monitoring the implementation of chain-of-custody procedures.

- Submit copies of the completed chain-of-custody forms to the Project Manager daily.

6.3 Chain-of-Custody

Chain-of-custody is initiated in the laboratory when the sample containers are cleaned, packed, and shipped to the site for use in the field. When the containers are received from the laboratory, they will be checked for any breach of custody including, but not limited to incomplete chain-of-custody records, broken chain-of-custody seals, or any evidence of tampering. Upon receipt of the samples, the laboratory will check for breach of custody as previously described.

6.4 Sample Containers and Holding Times

Table 6-1 identifies the analytical method, container, preservation, and holding time requirements. All holding times begin with the date/time of sample collection, except where noted otherwise in Table 6-1.

7.0 ANALYTICAL PROCEDURES

Table 4-1 identifies the specific methods to be performed on the individual matrices. All analyses will be performed in accordance with the following document:

- *New York State Department of Environmental Conservation Analytical Services Protocol,* July 2005 Edition.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

8.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished per the methods referenced in Table 4-1. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer=s name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with American Society of Testing Materials (ASTM) specifications. Calibration is conducted with two Class-1 weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards

and reagents is not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (4ºC ± 2ºC for refrigerators) shall be clearly posted on each unit in service.

Water Supply System - The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

Air Supply System - The laboratory must maintain a sufficient clean (analyte free) air supply for all project needs if required. The grade of the air must be of the highest quality (analyte-free) in order to eliminate false-positives from the analytical results. Appropriate documentation of the quality of the air supply system(s) will be performed on a regular basis by the laboratory.

8.2 Laboratory Instruments

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet method established quantitation limits. Each instrument for organic analysis shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to methods specified in Table 4-1.

Calibration of an instrument must be performed prior to the analysis of any samples (initial calibration) and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still properly calibrated. If the contract laboratory cannot meet the method-required calibration requirements, corrective action shall be taken as discussed in Section 11.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed - batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be determined by the specified analytical method and project specific requirements. Acceptable criteria and/or target ranges for these QC samples shall meet method-specific QC requirements.

QC results, which vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC will be analyzed are discussed below.

9.1 Batch QC

Method Blanks - A method blank is defined as laboratory demonstrated analyte free water or solid that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples - An MSB or LCS is an aliquot of demonstrated analyte free water or solid spiked (fortified) with all or a representative group of the analytes being analyzed. The MSB or LCS is a measure of precision and accuracy used to verify that the analysis being performed is in control. An MSB or LCS will be performed for each matrix as required by the analytical methods referenced in Table 4-1. Acceptable criteria and/or target ranges for these QC samples shall meet method-specific QC requirements.

9.2 Matrix-Specific QC

Matrix Spike Samples - An aliquot of sample is spiked with known concentrations of specific compounds as stipulated by the methodology. The MS/MSD samples are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery of each analyte and RPD between the concentrations of each analyte in the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per twenty samples, as listed in Table 4-1. Acceptable criteria and/or target ranges for these QC samples shall meet method-specific QC requirements.

9.3 Additional QC

Rinsate (Equipment) Blanks – Rinsate blanks are not required when dedicated disposable sampling equipment are used. A rinsate blank is a sample of laboratory demonstrated analyte-free water passed over or through the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from sample instruments used to collect and transfer samples. The water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks will be performed at the rate listed in Table 4-1.

Trip Blanks - Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. These samples then accompany the bottles that are prepared at the laboratory into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the laboratory with the same set of bottles they accompanied to the field. Trip blanks will be analyzed for volatile organics only. Trip blanks will be analyzed at the frequency stated in Table 4-1.

Field Duplicates – A field duplicate (FD) sample pair are independent samples, which are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. Field duplicates are useful in documenting the precision of the sampling process. Blind field duplicates will be collected at the frequency listed on Table 4-1. The field duplicates will be labeled so that the laboratory cannot determine or identify the location from, which the field duplicate was collected.

10.0 CALCULATION OF DATA QUALITY INDICATORS

10.1 Precision

Precision is evaluated using results from field duplicate and/or MS/MSD analyses. The RPD between the parent sample/field duplicate or between the MS/MSD concentrations is used to evaluate precision and calculated by the following formula:

$$RPD = \left[\frac{|X_1 - X_2|}{(X_1 + X_2)/2} \right] x100\%$$

where:

X_1 = *Measured value of sample or matrix spike*

X_2 = *Measured value of duplicate or matrix spike duplicate*

RPD criteria for this project shall meet method-specific QC requirements.

10.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. Analytical accuracy is expressed as the %R of a compound that has been added to the environmental sample or laboratory demonstrated analyte free matrix at known concentrations before analysis. Accuracy will be determined from MS, MSD, MSB (or LCS) samples as well as from surrogate compounds and is calculated as follows:

$$\%R = \frac{(X_s - X_u)}{K} \, x \, 100\%$$

where:

X_s - Measured value of the spike sample

X_u - Measured value of the unspiked sample

K - Known amount of spike in the sample

%R criteria for this project shall meet method-specific QC requirements.

10.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\%\ Completeness = \frac{(N - X_n)}{N}\ x\ 100\%$$

where:

X_n - Number of invalid measurements

N - Number of valid measurements expected to be obtained

11.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the analytical report case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

11.1 Incoming Samples

Problems noted during sample receipt shall be documented by the laboratory. The Project Chemist (or designee) shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

11.2 Sample Holding Times

If any sample extractions and/or analyses exceed method holding time requirements, the Project Chemist (or designee) shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

11.3 Instrument Calibration

Sample analysis shall not be allowed until all laboratory instrumentation is properly calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed and, if necessary, samples back to the previous acceptable continuing calibration standard must be reanalyzed.

11.4 Quantitation Limits

The laboratory must meet all quantitation limits listed in Table 4-2. If difficulties arise in achieving these limits due to a particular sample matrix, the laboratory must notify the URS project chemist for problem resolution. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must report the results from initial analyses and secondary dilution analyses. Dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a dilution with no target analytes detected, the Project Chemist (or designee) will be immediately notified so that appropriate corrective actions can be initiated.

11.5 Method QC

All QC, including blanks, matrix spikes, matrix spike duplicates, surrogate recoveries, matrix spike blank samples, and other method-specified QC samples, shall meet the requirements of the methods referenced in Table 4-1 and Table 4-2. Failure of method-required QC will result in the possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria as defined by the data validation guidelines identified in Section 12.2. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed. The Project Chemist shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

11.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

12.0 DATA REDUCTION, VALIDATION, AND USABILITY

For all analyses, NYSDEC ASP Category B deliverable requirements will be employed for documentation and reporting of all data. The standard NYSDEC Data Package Summary will be completed by the analytical laboratory and included in the deliverable data packages. In addition, analytical results will be reported in a NYSDEC EQuIS electronic data deliverable (EDD) format.

12.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either graphic or printed tabular form. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Data for aqueous samples will be reported in concentrations of micrograms per liter (µg/L) or milligrams per liter (mg/L).

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or other reliable commercial sources. Individuals experienced with a particular analysis and knowledgeable of requirements will perform data reduction.

12.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use.

Data validation will be performed by the Project Chemist and/or environmental chemists under his/her supervision. All analytical samples collected will receive a limited data review. This review will include a review of holding times; completeness of all required deliverables; review of QC results (surrogates, spikes, duplicates, and instrument calibration data blanks) to determine if the data is within the protocol-required limits and specifications; a determination that all samples were analyzed using established and agreed upon analytical protocols; an evaluation of the raw data to

confirm the reported sample results; and a review of laboratory data qualifiers. The methods referenced in Table 4-1 as well as the general guidelines presented in the following USEPA Region II document will be used to aid the chemist during the data review:

- *Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, SW-846 Method 8260B & 8260C,* SOP No. HW-24, Revision 4, October 2014;

12.3 Data Usability

A Data Usability Summary Report (DUSR) will be prepared in accordance with NYSDEC Division of Environmental Remediation *DER-10 Guidance for the Development of Data Usability Summary Reports*, dated May 2010, and will describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems are identified and their effect on the data will be discussed. The DUSR, which will be submitted to the NYSDEC, will also include recommendations on resampling/reanalysis.

13.0 PREVENTIVE MAINTENANCE

The laboratory is responsible for maintaining its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs will be available for inspection by auditing personnel.

14.0 PERFORMANCE AND SYSTEM AUDITS

Audits are evaluations of both field and laboratory QC procedures, and are performed before or shortly after systems are operational. Performance audits are conducted by introducing control samples into the data production process. These control samples may include performance evaluation samples, or field samples spiked with known amounts of analytes.

System audits are onsite qualitative inspections and reviews of the quality assurance system used by some part of or the entire measurement system. They provide a quantitative measure of the quality of the data produced by one section or the entire measurement process. The audits are performed against a set of requirements, which may be a quality assurance project plan or work plan, a standard method, or a project statement of work. The primary objective of the systems audits is to verify that the QA/QC procedures are being followed.

14.1 Performance and External Audits

In addition to conducting internal reviews and audits, as part of its established quality assurance program, the laboratory is required to take part in regularly scheduled performance evaluations and laboratory audits from state and federal agencies. They are conducted as part of the certification process and to monitor the laboratory performance. The audits also provide an external quality assurance check of the laboratory, and provide reviews and information on the management systems, personnel, standard operating procedures, and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance. Problems detected in these audits shall be reviewed by the QA Manager and Laboratory Management, and corrective action shall be instituted as necessary.

14.2 Systems/Internal Audits

As part of its Quality Assurance Program, the Laboratory Quality Assurance Manager shall conduct periodic checks and audits of the analytical systems. The purpose of these is to verify that the analytical systems are working properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits also assist in determining or detecting where problems are occurring.

The QA Manager periodically will submit laboratory control samples. These samples will serve to check the entire analytical method, the efficiency of the preparation method, and the analytical instrument performance. The results of the control samples are reviewed by the QA Manager who reports the results to the analyst and the Laboratory Director. When a problem is indicated, the QA Manager will assist the analyst and laboratory management in determining the reason and in developing solutions. The QA Manager will also recheck the systems as required.

REFERENCES

Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy , Revision I, October 1989.

National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures.* Washington: USEPA.

New York State Department of Environmental Conservation (NYSDEC), 1998. Division of Water Technical and Operational Guidance Series (TOGS 1.1.1), *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitation*. June.

NYSDEC. 2005. Analytical Services Protocol, July.

NYSDEC. 2010. Division of Environmental Remediation, *DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B, Guidance for Data Deliverables and the Development of Data Usability Summary Reports*. May.

USEPA. 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87-001, (OSWER Directive 9355.0-14). December. Cincinnati, OH: USEPA.

USEPA. 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, EPA/240/B-06/001. February.

USEPA. 2014. *Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, SW-846 Method 8260B & 8260C*, SOP No. HW-24, Revision 4. Region II. October.

TABLES

TABLE 4-1
SUMMARY OF SAMPLES TO BE COLLECTED AND ANALYTICAL PARAMETERS
315 NORTH MEADOW STREET SITE
NYSDEC SITE NUMBER: 755014

Parameter	Analytical Method [1]	Estimated Number of Samples	Field QA/QC Samples [2]				Total No. of Annual Samples
			Field Duplicates	MS/MSD Pairs	Rinsate Blanks	Trip Blanks	
I. Groundwater Samples - Annual Monitoring							
Target Compound List (TCL) VOCs	SW8260C	14	1	1	1	2	20

Notes:

1. NYSDEC Analytical Services Protocol (ASP), July 2005 Edition.

2. Field duplicates and matrix spike/matrix spike duplicate (MS/MSD) pairs will be collected at a frequency of 1 per 20 samples per matrix per sampling event. Rinsate blanks will be collected at a frequency of 1 per sampling equipment type per sampling event only when non-dedicated/disposable equipment are used. Trip blanks will be collected per sample shipment.

TABLE 4-2
GROUNDWATER QUANTITATION LIMITS AND NYSDEC AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES
315 NORTH MEADOW STREET SITE
NYSDEC SITE NUMBER: 755014

Matrix: Groundwater			
Analytical Method [1]	**Parameter**	**PQL (ug/L)**	**GW Class GA Criteria [2] (ug/L)**
SW8260C - VOCs	1,1,1-Trichloroethane	1	5
	1,1,2,2-Tetrachloroethane	1	5
	1,1,2-Trichloro-1,2,2-trifluoroethane	1	5
	1,1,2-Trichloroethane	1	1
	1,1-Dichloroethane	1	5
	1,1-Dichloroethene	1	5
	1,2,3-Trichorobenzene	1	5
	1,2,4-Trichlorobenzene	1	5
	1,2-Dibromo-3-chloropropane	1	0.04
	1,2-Dibromoethane	1	0.006
	1,2-Dichlorobenzene	1	3
	1,2-Dichloroethane	1	0.6
	1,2-Dichloropropane	1	1
	1,3-Dichlorobenzene	1	3
	1,4-Dichlorobenzene	1	3
	1,4-Dioxane	100	NS
	2-Butanone	5	50
	2-Hexanone	5	50
	4-Methyl-2-pentanone	5	NS
	Acetone	5	50
	Benzene	1	1
	Bromochloromethane	1	5
	Bromodichloromethane	1	50
	Bromoform	1	50
	Bromomethane	1	5
	Carbon disulfide	1	60
	Carbon tetrachloride	1	5
	Chlorobenzene	1	5
	Chloroethane	1	5
	Chloroform	1	7
	Chloromethane	1	5
	cis-1,2-Dichloroethene	1	5
	cis-1,3-Dichloropropene	1	0.4
	Cyclohexane	1	NS
	Dibromochloromethane	1	50
	Dichlorodifluoromethane	1	5
	Ethylbenzene	1	5
	Isopropylbenzene	1	5
	Methyl acetate	1	NS
	Methyl tert-butyl ether	1	10
	Methylcyclohexane	1	NS
	Methylene chloride	1	5
	Styrene	1	5
	Tetrachloroethene	1	5
	Toluene	1	5
	trans-1,2-Dichloroethene	1	5
	trans-1,3-Dichloropropene	1	0.4
	Trichloroethene	1	5
	Trichlorofluoromethane	1	5
	Vinyl chloride	1	2
	Xylene (total)	2	5

Notes:

1. NYSDEC Analytical Services Protocol (ASP), July 2005 Edition.

2. NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998.

VOCs - Volatile Organic Compounds
PQL - Practical Quantitation Limit
ug/L - Micrograms per Liter
NA - Not Applicable

TABLE 6-1
SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
315 NORTH MEADOW STREET SITE
NYSDEC SITE NUMBER: 755014

Analytical Parameter	Container Size/Type*	Containers Per Sample	Preservation	Maximum Holding Time**
I. Groundwater Samples				
TCL VOCs	40 mL glass vial	3	HCl to pH<2, 4 ^{o}C	Analysis: 14 days (7 days if not preserved to pH<2)

Notes:
* Number and size of containers may vary based on laboratory sample volume requirements.
** - Holding times are from date of sample collection.

APPENDIX G – SITE MANAGEMENT FORMS

315 NORTH MEADOW STREET
NYSDEC SITE NO. 808018
INSPECTION FORM

GENERAL INFORMATION

Date:		**Inspector:**	
Weather:		**Signature:**	
Temperature:		**Company:**	
Season (circle one): Winter Spring Summer Fall			

SITE INSPECTION LOG SHEET*

Evidence of Site-Wide Disturbance(s)	Yes No	**Description of Disturbance(s)**	
Evidence of Cover System Disturbance(s)	Yes No	**Description of Disturbance(s)**	
Evidence of Site-Wide Excavation	Yes No	**Description of Excavation**	
Evidence of Cover System Excavation	Yes No	**Description of Demolition**	
Evidence of Building Construction	Yes No	**Description of Building Construction**	
Evidence of Change in Site Use	Yes No	**Description of New/Additional Site Use**	
SSD System Operating	Yes No	**Operational Evaluation**	
Comments:			

* If answering Yes, attach map showing locations and any other information as required.

315 North Meadow Street Site
NYSDEC SITE NO. 755014
Summary of Green Remediation Metrics for Site Management

Site Name: 315 North Meadow Street Site Site Code: 755014

Address: 315 North Meadow Street City: Ithaca

State: New York Zip Code: _____ County: Tompkins

Initial Report Period (Start Date of period covered by the Initial Report submittal)

Start Date: _____

Current Reporting Period

Reporting Period From: _____ To: _____

Contact Information

Preparer's Name: _____ Phone No.: _____

Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**

Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:

Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**

APPENDIX H – FIELD SAMPLING PLAN

315 NORTH MEADOW STREET SITE

CITY OF ITHACA

TOMPKINS COUNTY, NEW YORK

NYSDEC SITE NUMBER: 755014

FIELD SAMPLING AND ANALYSIS PLAN

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

625 Broadway

Albany, New York 12233

Prepared by:

URS CORPORATION

257 West Genesee Street, Suite 400

Buffalo, New York 14202

November 2017

TABLE OF CONTENTS

FIELD SAMPLING AND ANALYSIS PLAN

TABLES

FIGURES

APPENDIX

1.0 INTRODUCTION

This Field Sampling and Analysis Plan (FSAP) is designed to provide detailed step-by-step procedures for the field activities performed during the post-remediation long-term groundwater monitoring program at the 315 North Meadow Street site (Site) located in the City of Ithaca, Tompkins County, New York (Figure 1) and for any soils or vapor intrusion sampling that may be required in the future. It will serve as the field procedures manual to be strictly followed by all project personnel. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with: (1) the Quality Assurance/Quality Control (QA/QC) measures outlined in the existing Quality Assurance Project Plan; (QAPP); (2) the appropriate Health and Safety guidelines found in the example Health and Safety Plan (HASP); and (3) the scope of work outlined in the Site Management Plan (SMP) (URS, 2015).

Groundwater monitoring well locations are shown on Figure 2. A groundwater level measurement will be recorded at each sampled monitoring well. Table 1 lists, on an annual basis, which monitoring wells will undergo annual water level measurements and water quality sampling.

No specific soil or soil vapor intrusion sampling is envisioned under current conditions. However, procedures are provided in this plan should the need arise in the future for this type of sampling.

2.0 GROUNDWATER SAMPLING AND ANALYSIS PROCEDURES

2.1 Water Level Monitoring Procedures

Summary: Determination of groundwater depths in monitoring wells is necessary to calculate required purge volumes prior to groundwater sampling and to make potentiometric surface maps. Water levels in monitoring wells scheduled to be sampled during the field work will be measured using an electronic interface probe/water level indicator. During each monitoring event, water levels to be used to generate potentiometric groundwater surface contour maps will be collected from all sampled monitoring wells. Water level measurement procedures are presented below.

Procedure:

1) Clean the water level probe and the lower portion of cable following standard decontamination procedures and test water level meter to ensure that the batteries are charged.

2) Lower the probe slowly into the monitoring well until the solid audible alarm indicates water.

3) Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference.

3) Repeat the measurement for confirmation and record the water level.

4) Lower the probe slowly to the bottom of the monitoring well. Record the bottom depth of the well.

6) Remove the probe from the well slowly, drying the cable and probe with a clean paper towel.

7) Replace the well cap.

8) Decontaminate the water level meter if additional measurements are to be taken.

2.2 Well Purging Procedures

Well purging will be completed using the low-flow purging technique as follows:

1) The well cover will be carefully removed to avoid having any foreign material enter the well

2) Using an electronic interface probe, the water level below top of casing will be measured. The depth of the well will be measured to determine the volume of water in the well. The end of the probe will be decontaminated between wells. The depth to bottom of the well will be recorded from the V notch in the top of the casing.

3) Calibrate field instruments [e.g., pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), specific conductance, temperature, and turbidity].

4) Start the flow rate low and maintain it between 100 and 500 ml/min, optimally 250 ml/min.

5) Purge the required water volume (i.e., until stabilization of pH, DO, ORP, temperature, specific conductivity, and turbidity) using a low-flow pump (e.g., bladder pump) and dedicated high density polyethylene (HDPE) tubing. During purging, it is permissible to by-ass the flow cell until the groundwater has cleared. New dedicated tubing and bladder will be used for each well.

6) Purge the well until the water quality parameters have stabilized. Collect groundwater parameters every five minutes until the well has stabilized. The respective measurements of the parameters must fall within the stated range for three consecutive readings. If, after four hours, stability has not been achieved for the parameters listed below, the well can be sampled. The stabilization criteria are: DO ± 10% full-scale range; ORM ± 10%; specific conductivity ± 3% full-scale range; pH ± 0.10 pH unit; temperature ± 0.2°C, and turbidity ± 10% if greater than 50 nephelometric turbidity unit (NTU).

7) Purging of three well volumes is not necessary if the indicator parameters are stable. However, a minimum of thirty minutes of purging is required before

sampling, even if the parameters are stable. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

8) Well purging data are to be recorded on the Low Flow Groundwater Purging/Sampling Log (Appendix A).

2.3 Groundwater Sampling Procedures

The following groundwater sampling procedures will be used for monitoring wells after purging has been conducted:

Procedures

1) After well purging is completed, the flow cell will be disconnected and drained and a sample will be collected into the appropriate laboratory supplied containers from the well tubing well, without changing the purge rate.

2) Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.

3) All sample bottles will be labeled in the field using a waterproof permanent marker.

4) Samples will be collected into laboratory-provided sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody (COC) record (Appendix A) will be initiated. The analytical laboratory will provide certified analyte-free sample bottles.

5) After the required sample containers have been filled, remove dedicated/disposable HDPE tubing and bladder pump. Decontaminate the bladder pump with laboratory grade soap and distilled water and rinse with distilled water before reassembling with an unused bladder.

6) Well sampling data are to be recorded in the field notebook and on the Well Purging Log.

7) Groundwater samples will be placed on ice, and delivered to the laboratory either by the laboratory courier or common courier (e.g. FedEx) under COC control. The volume of sample required, bottle type and required quality assurance/quality control (QA/QC) may be found in the QAPP, Table 6-1. Groundwater samples will be collected for the parameters referenced in the QAPP, Table 4-1 (i.e., VOCs). In lieu of field filtering, metals samples may be sent to the laboratory unpreserved, whereupon they will be filtered upon receipt using a disposable 0.45 micron filter, prior to preservation. Samples must be received by the laboratory less than 24 hours after collection.

Any observations of sheen, blebs, free-phase product/tar, staining or coating of the sampling equipment, odor, etc. that were made during sampling of groundwater are to be included in the groundwater sample collection log.

2.4 Sample Labeling

Summary: In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, the following procedures will be used:

Procedure: Each container will have the following information placed on the laboratory supplied sample label:

- Site name
- Sample identification
- Project number
- Date/time
- Sampler's initials
- Analysis required and preservatives

Sample identification numbers will be assigned based on the well identification and will be the same for all parameters collected. For example, a groundwater sample extracted from monitoring well MW-04S would have the same identifier assigned, MW-04S for VOCs, metals, etc.

Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the data of collection, the letters DUP (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on November 17, 2015 would be assigned the following sample number using the code shown below:

DUP-MMDDYY = DUP-111715

Subsequent duplicates collected on the same day would be assigned FD-111715-2, FD-111715-3, etc. The field duplicate IDs are "blind", so that the laboratory cannot trace them to their parent samples. Field sampling crew will record the duplicate sample information on the appropriate Sampling Field Data Sheets and also in the field notebook. The sample will be added to the COC with the time of collection of 0000.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will use the same well identification name as the groundwater sample, with the acronym MS/MSD after it; for example, MW-04S (MS/MSD). The sample will be added to the COC with the same time of collection as the groundwater sample.

Rinsate (Equipment) Blank samples will be labeled with the letters RB (rinsate blank) and the date of collection in the same order as for the field duplicate and added to the COC (e.g., using the same date as above, RB-111715).

Trip blanks will be labeled with the letters TB (trip blank) and the date in the same order as the field duplicate and added to the COC (e.g., for example, using the same date as above, TB-111715).

2.5 Quality Assurance/ Quality Control Sampling

QA/QC procedures are described in the Quality Assurance Procedure Plan (QAPP). QA/QC groundwater samples will be collected as follows:

- Field duplicates will be collected at the rate of one per twenty (5%) groundwater samples collected. It will be collected directly following the groundwater sample collected at the selected well for the same parameters as the groundwater sample.

- Matrix Spike/ Matrix Spike Duplicate (MS/MSD) samples will be collected at a rate of one per twenty (5%) groundwater samples collected. It will be collected directly following the groundwater sample collected at the selected well for the same parameters as the groundwater sample.

- Rinsate (Equipment) Blank samples will be collected one time per event. Laboratory provided deionized water will be run through the bladder pump and collected for the same parameters as the groundwater sampling program. If dedicated, disposable sampling equipment is used, rinsate blanks will not be collected.

- Trip Blanks will be provided by the laboratory filled with analyte-free water and returned at the rate of one per sample pickup.

3.0 SOIL SAMPLING AND ANALYSIS PROCEDURES

Soils samples will be collected from either test pits or through the use of direct push sample collection techniques.

3.1 Test Pit Trench Excavation and Sampling

Summary: Test pits and trenches allow for visual inspection and sample collection directly from the subsurface.

Procedure:

1) Verify the absence of subsurface utilities using hand excavation or geophysics
2) Decontaminate backhoe bucket prior to excavation.
3) Maneuver backhoe into position.
4) Remove subsurface materials in 1-foot lifts. Conduct continuous air monitoring with appropriate air monitoring equipment as indicated in the Health and Safety Plan (HASP). Screen soil with photoionization detector (PID) and place excavated soil on plastic sheeting adjacent to test pit.
5) Upon completion of test pit trench, visually inspect the soil horizons for discoloration, perched water zones or staining and photo document the test pit trench.
6) Record the following information in the fieldbook for each test pit trench:
    - The total length and width of the excavation
    - The depth and thickness of distinct soil or lithologic units
    - A lithologic description of each unit
    - A description of any man-made materials or apparent impacted soil encountered.
    - A Test Pit Log sheet (Appendix A) will be completed for each test pit.
7) Collect necessary soil samples. The excavator will collect a sample from a specific horizon and bring the sample to the ground surface. No personnel will enter the

excavation to collect samples. The sampler will remove approximately 2 inches of soil from the outside of the soil sample prior to collecting the sample to prevent cross contamination of the sample.

8) Soil samples will be placed on ice and shipped overnight to the laboratory under COC control.

9) The test pit trench will be backfilled with excavated material immediately after the required information has been recorded and the samples collected. The first soils out should be the last soils in when filling the test pit trench. Soils will be compacted in 1-foot lifts using the excavator bucket. No test pits or trenches will be left open overnight.

10) Decontaminate sampling equipment and excavator bucket.

3.2 Direct Push Soil Sampling

Summary: Direct Push is a standard method of subsurface boring using hydraulically powered soil-probing equipment that enables the recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

1) Verify the absence of subsurface utilities using hand excavation or geophysics

2) Inspect the sampling equipment to ensure proper working condition.

3) Insert dedicated disposable acetate liner into the sampler and select additional components for the sampler as required (i.e., leaf spring core retainer for clays, or a sand trap for non-cohesive sands).

4) Lower the sampler to the ground surface, or bottom of the hole previously made by the sampler, and check the depth against length of the rods and the sampler.

5) Attach the drive head assembly to the sample rods.

6) Push the sampler in 4-foot increments into the subsurface up to the desired depth with a hydraulic press.

7) Rotate the sampling rods clockwise and remove the sampler.

8) Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.

9) Document all properties and sample locations in the field notebook, and later on the Direct-Push Log form (Appendix A).

10) Abandon the direct-push boring by backfilling with bentonite pellets and hydrate with potable water or use concrete patch in impervious areas.

3.3 Sample Labeling

Summary: In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, the following procedures will be used:

Procedure: Each container will have the following information placed on the laboratory supplied sample label:

- Site name
- Sample identification
- Project number
- Date/time
- Sampler's initials
- Analysis required and preservatives

Sample identification numbers will be assigned based on the well identification and will be the same for all parameters collected. For example, a soil sample extracted from location SS-01 would have the same identifier assigned, SS-01 for VOCs, metals, etc.

Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the data of collection, the letters DUP (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on November 17, 2018 would be assigned the following sample number using the code shown below:

DUP-MMDDYY = DUP-111718

Subsequent duplicates collected on the same day would be assigned FD-111718-2, FD-111718-3, etc. The field duplicate IDs are "blind", so that the laboratory cannot trace them to their parent samples. Field sampling crew will record the duplicate sample information on the appropriate Sampling Field Data Sheets and also in the field notebook. The sample will be added to the COC with the time of collection of 0000.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will use the same well identification name as the groundwater sample, with the acronym MS/MSD after it; for example, SS-01 (MS/MSD). The sample will be added to the COC with the same time of collection as the groundwater sample.

Rinsate (Equipment) Blank samples will be labeled with the letters RB (rinsate blank) and the date of collection in the same order as for the field duplicate and added to the COC (e.g., using the same date as above, RB-111715).

Trip blanks will be labeled with the letters TB (trip blank) and the date in the same order as the field duplicate and added to the COC (e.g., for example, using the same date as above, TB-111715).

3.4 Quality Assurance/ Quality Control Sampling

QA/QC procedures are described in the Quality Assurance Procedure Plan (QAPP). QA/QC groundwater samples will be collected as follows:

- Field duplicates will be collected at the rate of one per twenty (5%) soil samples collected. It will be collected from the same location the primary soil sample was collected and analyzed for the same parameters as the primary sample.

- Matrix Spike/ Matrix Spike Duplicate (MS/MSD) samples will be collected at a rate of one per twenty (5%) soil samples collected. It will be collected from the same location the primary soil sample was collected and analyzed for the same parameters as the primary sample.

- Rinsate (Equipment) Blank samples will be collected one time per event. Laboratory provided deionized water will be run through the bladder pump and collected for the

same parameters as the soil sampling program. If dedicated, disposable sampling equipment is used, rinsate blanks will not be collected.

- Trip Blanks will be provided by the laboratory filled with analyte-free water and returned at the rate of one per sample pickup.

4.0 SOIL VAPOR INTRUSION SAMPLING AND ANALYSIS PROCEDURES

Indoor air investigations will generally include the following tasks at each residence: 1) conducting interviews with homeowners using air quality questionnaires provided by the New York State Department of Health (NYSDOH) (Appendix A); 2) conducting a brief survey of household chemicals present and evaluating their potential to affect air sample results; 3) collecting one indoor air sample each from the breathing zones of the first floor and basement areas, and; (4) collecting one soil vapor sample from beneath the basement concrete slab. In addition, one or two outdoor air samples will be collected from the residential sampling area for each day that sampling is taking place.

4.1 Indoor Air Quality Survey and Questionnaire

Once the homeowners have been contacted by the New York State Department of Environmental Conservation (NYSDEC) and/or NYSDOH, appointments will be made to conduct homeowner/occupant interviews and building inventory of household chemicals. Questionnaire and Building Inventory forms provided by the NYSDOH (Appendix A) will be used. Once the questionnaires have been completed, a brief inventory of household chemicals stored in the basement area will be prepared. The inventory will consist of a general description of areas where chemicals are stored and the types and approximate numbers of chemicals present. During this inventory, a ppbRAE photo ionization detector (PID) should be used to measure the presence of volatile organic compounds (VOCs) in those areas where the chemicals are found. Also during the inventory, a handout will be provided to the residents that list home activities that should be avoided prior to and during the air sampling. This handout is provided in Appendix A. The general procedures to be followed during the surveys are summarized below:

- Identify all areas on the basement level that may be used for storage of chemical containers. Also record the general types and approximate quantities of chemicals stored and VOCs present in the atmosphere in the areas of chemical storage.
- Other potential sources that may influence air quality testing that should be noted and scanned with the PID include: new construction/remodeling/painting, new carpeting, and freshly dry-cleaned clothing.

4.2 Sub-Slab Air Sampling Procedures

One sub-slab air sample will be collected at each sampled residence. As directed by the NYSDEC, additional samples (up to a total of three) may be collected at some of the residences. A minimum of one sub-slab sample at each residence will be tested for an adequate surface seal before and after testing using the helium tracer gas test procedures outlined below.

The sub-slab air sampling procedures are summarized below:

1) Select and prepare the sub-slab sample collection point by observing the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. The floor conditions will be noted and a potential location of a subsurface probe will be selected. The location will ideally be central to the building, and away from the foundation walls, apparent penetrations and buried pipes. **Review all locations with the Homeowner prior to drilling any hole!** Photograph and document all sample locations.

2) In locations where bare concrete is available, drill a 5/8-inch diameter hole about one-inch (1") into the concrete using an electric hammer drill. Extend the hole through the remaining thickness of the slab using a ½ -inch drill bit. Lengthen the hole about three inches (3") beyond the sub-slab using the drill bit.

3) Remove the concrete dust within the 5/8-inch drilled hole and around the hole using wire brushes and a brush and dust pan, then dabbing the surface with Sculpy brand clay (see below).

4) Insert a 5/8-inch outside diameter (OD) by ¼-inch inside diameter (ID) rubber stopper onto and three-inches beyond the end of a 1/4-inch OD by 1/8-inch ID Teflon tube. Insert the Teflon tube into the 5/8-inch hole so the stopper is seated into the top of the ½-inch drilled hole.

5) Seal the annular space between the 5/8-inch hole and the Teflon tubing with white Sculpey Brand modeling clay (or equivalent). Bring the clay above the floor's surface and around the tubing in a volcano-like shape.

6) In locations where only linoleum tile is available, **AND THE OWNER AGREES**, drill a small (1/4-inch best) hole through the tile and slab. Place the sample tubing into the hole and seal to the floor with clay.

7) Purge the sampling tube by connecting the Teflon tubing to the inlet of an air-sampling pump (Gilair 300 or 500) with 3/8-inch OD silicone tubing, and connecting a 1 liter (L) Tedlar bag to the outlet of the pump with silicone tubing. Purge approximately one liter (1L) of gas from the subsurface probe into the Tedlar bag, using the air-sampling pump. Analyze the one-liter Tedlar bag containing the sub-slab purged air with a gas detector that records the concentrations of CH4, CO2 and O2. Record the purge times (start and stop) and the gas concentrations on a Summa Canister Data Sheet (Appendix A). Purging flow rates must not exceed 0.2 liters per minute (L/min).

8) Assign sample identification to the Summa canister identification tag and record on chain of custody (COC), and the Summa Canister Data Sheet. Also record the Summa canisters serial number on the Summa Canister Data Sheet.

9) Remove brass plug from canister fitting.

10) Attach a pre-calibrated/certified 24-hour flow controller, and particulate filter to the Summa canister. Record the regulator serial number on the Summa Canister Data Sheet (Appendix A).

11) Attach the sample tube to the Summa canister using a ¼-inch Swagelok nut with appropriate ferrules, via the flow controller/particulate filter assembly.

12) Open canister valve to initiate sample collection and record sample start time, date and initial vacuum on the canister identification tag and on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25 " Hg), do not use. Take a digital photograph of canister setup and surrounding area. Include in the photograph a dry erase board or similar display which presents sample ID and date.

13) After 24 hours, record sample end time and canister pressure on the Summa Canister Data Sheet, and close valve.

14) Disconnect the Teflon tubing and remove flow controller/particulate filter assembly from canister. Seal canister with brass plug.

15) Seal the hole in the basement slab with hydraulic cement patch.

16) Ship samples with COCs, overnight, to Air Toxics, or other selected laboratory, for TO-15 analysis.

Using Helium Tracer Gas to Test Floor Seals.

1) Drill the concrete floor and attach and seal the Teflon sample tubing to the floor as described above.

2) Place a 2-quart (or similar size) bucket over the floor seal after threading the Teflon sample tube through a hole in the top of the bucket. Seal the tube to the bucket with clay.

3) The bucket should also have a hole in the top for the injection of helium gas. An additional hole should be present in the side, near the bottom, to measure the concentration of helium gas in the bucket.

4) Connect helium (99.999%) cylinder tubing to the top port of bucket enclosure and seal with clay or other sealing material. Insert a helium detector probe to the bottom port of the bucket.

5) Release enough helium to displace any ambient air in the bucket until the concentration of helium reaches a minimum of 90%. Maintain this minimum concentration by testing with a helium detector. The Helium cylinder should be open during the purge time to cause a slight positive pressure within the enclosure.

6) Connect the sample tubing to a GilAir vacuum pump or equivalent using 3/8-inch O.D. silicone tubing. Connect a 1-liter Tedlar bag to the outlet of the pump using silicone tubing and collect a 1-liter sample. Analyze the Tedlar bag for helium using a helium detector, and record the results on the Summa Canister Data Sheet. Also analyze the Tedlar bag for the presence of methane, H2S, CO2 and O2 and record the result on the Summa Canister Data Sheet. A concentration of helium 10% or greater indicates a poor seal of the sample tubing to the basement floor. The tubing must be resealed to the floor and another helium test conducted.

7) Purging flow rates must not exceed 0.2 liters per minute (L/min).

8) After purging, remove the bucket enclosure and assign sample identification to the Summa canister identification tag and record on the COC, and the Summa Canister Data Sheet. Also record the Summa canisters serial number on the Summa Canister Data Sheet.

9) Connect the 1/4-inch Teflon OD sample tubing to the Summa canister regulator inlet using a ¼-inch Swagelok nut with appropriate ferrules. Open the canister valve to initiate sample collection and record the start time and date and beginning vacuum on the canister identification tag and on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25 " Hg), do not use.

10) After 24 hours, record sample end time and final vacuum on the Summa Canister Data Sheet and close the valve.

11) Disconnect the Teflon tubing from the Summa canister and remove the flow controller/particulate-filter assembly from canister. Seal canister with brass plug.

12) Thread the Teflon sample tubing through the bucket enclosure and conduct a helium tracer gas test as described above. After purging, test the concentration of helium in the 1 liter Tedlar bag and record on the Summa Canister Data Sheet.

13) Remove the sample tubing, stopper and clay from the hole in the basement slab and seal with hydraulic cement patch.

14) Ship the samples, with COCs, overnight to Air Toxics, or other selected lab, for TO-15 analysis.

4.3 Indoor Air and Outdoor Air Sampling Procedure

Sampling procedures for the indoor samples and outdoor air sample are summarized below:

1) Place the basement and first floor summa canisters at breathing height in a high traffic location. The breathing height is defined as three to six feet above the floor. Place the outdoor air sample at least 2 to three feet above the ground.

2) Record the canister's serial number on the Summa Canister Data Sheet.

3) Assign sample identification to the canister identification tag (see Section 2.5 below) and

record on COC and the Summa Canister Data Sheet.

4) Remove brass plug from canister fitting.

5) Attach a pre-calibrated/certified 24-hour flow controller and particulate filter to the Summa canister, open valve completely to initiate sampling, and record the sample start time and date, and beginning vacuum reading on the canister identification tag and the Summa Canister Data Sheet. Also record the regulator serial number on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25" Hg), do not use.

6) Take a digital photograph of canister setup and surrounding area. Include a dry erase board or similar display which presents sample ID and date.

7) After 24 hours, record end time and pressure on the Summa Canister Data Sheet (Appendix A), and close valve.

8) Disconnect flow controller/particulate filter assembly from canister.

9) Seal canister with brass plug.

10) Ship canister standard overnight, with COC, to Air Toxics, or other selected laboratory, for TO-15 analysis.

4.4 Quality Control

Field duplicates for structure samples (10 percent) will be collected by attaching the T-fitting supplied by the laboratory to two Summa canisters with attached regulators. The inlet for the T-fitting will then be attached to the sub-slab sample tubing. Indoor air and outdoor air duplicates will also use T-fittings connected to two Summa canisters. Tubing will not be required unless needed to the raise the sampling point to the breathing zone. For sampling, both Summa canister valves are opened and closed simultaneously.

4.5 Sample Labeling

Each indoor air sample will have the following information placed on the laboratory supplied sample label:

- Site name

- Sample identification – see below
- Date/time
- Sampler's initials
- Analysis required – **TO-15**

The serial number of the canister and regulator used during sampling will also be noted on the Summa canister identification tag and on the COC.

The following terminology shall be used for the structure sample identification:

- 755014-SS-xx (for sub-slab locations)
- 755014-BA-xx (for basement indoor ambient air)
- 755014-FF-xx (for first floor indoor air)
- 755014-OA-xx (for outdoor ambient air)

Where xx is the structure identification number. Note: If multiple sub-slab samples in a single residence, they are identified as SSA, SSB, SSC, etc.

Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the date of collection, the letters FD (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on January 22, 2018 would be assigned the following sample number using the code shown below:

YYYYMMDD-FD-1 = 20180122-FD-1

Subsequent duplicates collected on the same day would be assigned FD-2, FD-3 etc. Field sampling crew will record the duplicate sample information on the Summa Canister Data Sheets and also in the field book.

5.0 FIELD DOCUMENTATION

Field notebooks will be used during all on-site work. A dedicated permanently-bound field notebook will provide a legal record and will be maintained by the field technician overseeing the site activities. Entries will be written with waterproof ink and will be of sufficient detail that a complete daily record of significant events, observations, and measurements is developed. At the conclusion of each day of fieldwork, entries will be signed and dated. Erroneous entries will be corrected by the field technician that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing/dating the correction.

The field sampling team will maintain the daily field notebook and logs, which will minimally include the following information:

1. Project name and location of field activity
2. Date and time of entry
3. Names and titles of field team members onsite
4. Names, titles of any site visitors, as well as date and time entering and leaving site
5. Weather information (e.g., temperature, precipitation, cloud coverage, wind speed and direction, etc.)
6. Purpose of field activity and detailed description of fieldwork conducted
7. Sample media to be collected
8. Sample Identification
9. Date and time of sample collection
10. Field observations and measurements (e.g., PID, water levels)
11. Sampling methods and devices
12. Purge volumes (groundwater)
13. Groundwater purge parameters e.g., pH, temperature, ORP, DO, conductivity, water levels, turbidity, etc.
14. Chain-of-custody and shipping information.

6.0 SAMPLE SHIPPING

Summary: Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. COC procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. COC procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this study follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1) A COC record is initiated at the analytical laboratory performing the sample analyses and will accompany the sample containers during preparation, delivery of the sample containers to the field, and during return shipment to the laboratory.

2) The COC record (Appendix A) should be completely filled out by field personnel with all applicable/relevant information as samples are collected and packed for shipment e.g., project name and number, field technician name, sample ID, date/time of collection, matrix, requested parameters, number of sample bottles, relinquishing/receipt signatures, method of sample shipment with shipper air-bill number, name of analytical laboratory, etc. Any erroneous markings will be crossed-out with a single line and initialed by the author.

3) The original COC accompanies the samples. It should be placed in a Ziplock bag and placed inside the cooler containing the samples. The sampler should retain a copy of the COC for the project records.

4) All soil and groundwater samples should be placed and stored on ice immediately after sample collection in the laboratory supplied coolers.

5) If the laboratory provides a courier to collect the samples from the site, samples should be

picked up on the day of collection. If that is not possible, the samples shall be stored on ice in a secure area then delivered to the laboratory the next day, or as soon as possible. Samples should not to be held onsite for more than two days.

6) If the courier is not provided, samples can be shipped via common courier. Pack the coolers with the samples wrapped in bubble wrap, place ice in plastic baggies to prevent any melt from leaking out of the cooler, and make sure samples will not shift in the cooler. Place the lab address on top of sample box/cooler. Affix numbered custody seals across the cooler lid. Cover seals with wide, clear tape.

7) Ship samples via overnight carrier the same day that they are collected and must be delivered to the laboratory within 48 hours of collection.

8) The COC seal must be applied in a manner where they must be broken in order to open the shipping container. Breakage of the seal before receipt at the laboratory may indicate tampering. If tampering is evident, the laboratory must immediately contact the laboratory Project Manager, whom further contacts the URS Project Manager for further instructions (i.e., cancel or proceed with analyses).

7.0 FIELD SAMPLING INSTRUMENTATION

URS-owned and rented field sampling equipment will require no maintenance beyond decontamination between sampling locations. Calibration procedures for electronic instruments can be found in the equipment operating manuals. Calibration and maintenance procedures for the common instrumentation that will be used during field investigations are discussed in the equipment operating manuals. A copy of the manufacturer's operating manual for each instrument will be kept with the instrument or the operator. All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions. The calibration procedures and results will be recorded in the field notebook. All changes to instrumentation will be noted in the field notebook.

The following field instruments will be used during project site work:

1) Multi-Parameter Meter (MultiRAE PLUS PGM-50 Monitor (10.6 eV lamp) with PID, %LEL) - Calibration of the meter and a battery check will be performed daily in accordance with manufacturer's specifications. Standards used for calibration will be National Institute of Standards and Technology (NIST) traceable. All calibration data will be recorded in the field notebook.

2) Turbidity Meter – The turbidity meter will be checked daily in accordance with manufacturer's specifications. All daily data will be recorded in the field notebook.

3) Horiba U-22 Multi-Parameter Meter – Calibration of the meter will be performed daily in accordance with manufacturer's specifications. All daily data will be recorded in the field notebook.

8.0 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

Summary: To assure that no outside contamination will be introduced into the samples/data, thereby invalidating the samples/data, the following cleaning protocols will apply for all equipment used to collect samples/data during the field investigations.

Procedures:

1) Thoroughly clean equipment with laboratory-grade soap and water, until all visible contamination is gone.
2) Rinse with water, until all visible evidence of soap is removed.
3) Rinse several times with deionized water.
4) Air dry before using.
5) If equipment will not be used immediately, wrap in aluminum foil.
6) Decontamination materials will be collected and placed in 55 gallon drums.

9.0 INVESTIGATION-DERIVED WASTE CHARACTERIZATION AND DISPOSAL

All decontamination water and purge water will be contained in a locked on-site above ground storage tank (AST).

Since investigation-derived wastes (IDW) were properly characterized during site remediation activities, there is no reason for further characterization of the IDW during the post-remediation long-term groundwater monitoring program.

The IDW subcontractor will be responsible for removing IDW from the work site as needed. All waste will be disposed of at a permitted off-site disposal facility.

10.0 **ANALYSIS**

Each groundwater sample will be analyzed by a NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory for those parameters referenced in the QAPP, Table 4-1 (i.e., VOCs). Field personnel will coordinate with the laboratory for the collection and delivery of the samples to the laboratory.

TABLES

Table 1
Water Level Measuements and Water Quality Sampling

Sampling Location	Water Level Measurements	VOCs (Method 8260C)	Frequency
NM-MW-01S	x	x	Annually
NM-MW-02S	x	x	Annually
NM-MW-02D	x	x	Annually
NM-MW-03S	x	x	Annually
NM-MW-03D	x	x	Annually
NM-MW-04S	x	x	Annually
NM-MW-04D	x	x	Annually
NM-MW-05S	x	x	Annually
NM-MW-06S	x	x	Annually
NM-MW-08S	x	x	Annually
NM-MW-09D	x	x	Annually
NM-MW-10D	x	x	Annually
NM-MW-11S	x	x	Annually
NM-MW-11D	x	x	Annually
NM-MW-12D	x	x	Annually

Notes:

VOC - Volatile Organic Compounds

FIGURES

Legend

Site Boundary

100 0 100

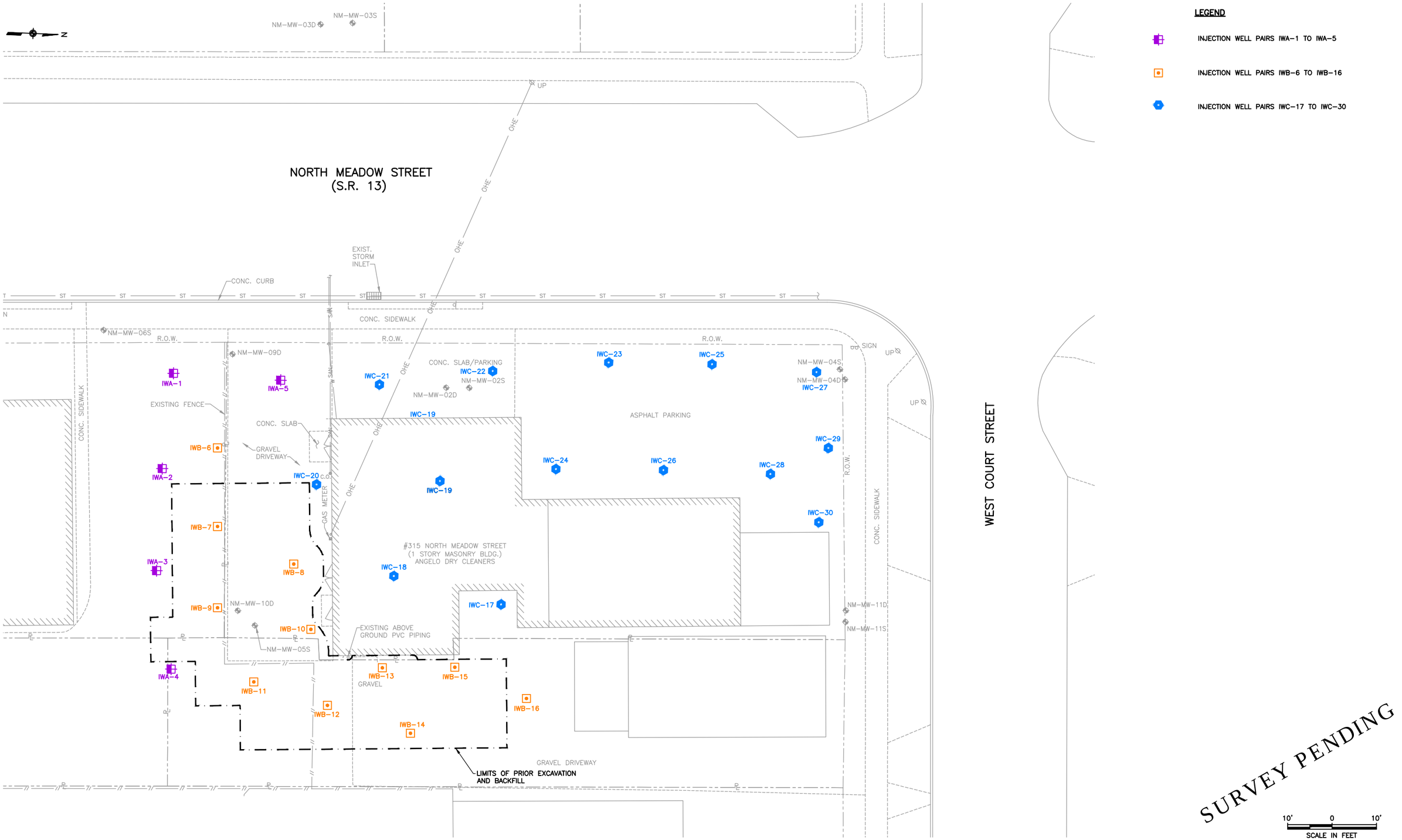
Feet

URS

315 NORTH MEADOW STREET
SITE LOCATION

FIGURE 1

N:\11174365.00000\DB\GIS\SitePlan.mxd 1/22/2008



I:\11176513\CAD\CCR FOR INJECTION\FIGURE 3.dwg 1=1 10/15/2013-1 ELB

WARNING
IT IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON OTHER THAN WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NO.	MADE BY	APPROVED BY	DATE	DESCRIPTION

REVISIONS

DESIGNED BY: BP
DRAWN BY: RAL
CHECKED BY: AMM
PROJ. MANGR. JAS

URS Corporation
New York
640 Ellicott Street, Buffalo, New York 14203
(716)856-5636 - (716)856-2545 fax

JOB NO. 11176513.00002

NYSDEC DIVISION OF ENVIRONMENTAL REMEDIATION
WORK ASSIGNMENT D004433-28

REMEDIAL DESIGN
315 NORTH MEADOW STREET

INJECTION WELL AND MONITORING WELL LOCATIONS

Scale: AS SHOWN | Date: OCT. 2013 | FIGURE 2

APPENDIX A

FIELD ACTIVITY FORMS

DAILY SAFETY MEETING

URS

DATE: _____ CUSTOMER: _____

SPECIFIC: _____

_____

SAFETY TOPICS PRESENTED:

PROTECTIVE CLOTHING/EQUIPMENT: _____

_____

CHEMICAL HAZARDS: _____

_____

PHYSICAL HAZARDS: _____

_____

EMERGENCY PROCEDURES: _____

_____

HOSPITAL/CLINIC: _____ PHONE: _____

PARAMEDIC PHONE: _____

HOSPITAL ADDRESS: _____

SPECIAL EQUIPMENT: _____

_____

OTHER: _____

_____

ATTENDEES:

NAME PRINTED: _____ SIGNATURE: _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

MEETING CONDUCTED BY:

_____ _____

Name Printed *Signature*

CHAIN OF CUSTODY RECORD

TESTS

URS

PROJECT NO. | SITE NAME

LAB _____

SAMPLERS (PRINT/SIGNATURE)

COOLER _____ of _____

BOTTLE TYPE AND PRESERVATIVE

PAGE _____ of _____

DELIVERY SERVICE: _____ AIRBILL NO.: _____

LOCATION IDENTIFIER	DATE	TIME	COMP/ GRAB	SAMPLE ID	MATRIX	TOTAL NO. OF CONTAINERS								REMARKS	SAMPLE TYPE	BEGINNING DEPTH (IN FEET)	ENDING DEPTH (IN FEET)	# (SEE SAMPLE TYPE CODES)

MATRIX CODES

AA - AMBIENT AIR; SE - SEDIMENT; SH - HAZARDOUS SOLID WASTE; SL - SLUDGE; WP - DRINKING WATER; WW - WASTE WATER; WG - GROUND WATER; SO - SOIL; DC - DRILL CUTTINGS; WL - LEACHATE; GS - SOIL GAS; WC - DRILLING WATER; WO - OCEAN WATER; WS - SURFACE WATER; WQ - WATER FIELD QC; LH - HAZARDOUS LIQUID WASTE; LF - FLOATING/FREE PRODUCT ON GW TABLE

SAMPLE TYPE CODES

TB# - TRIP BLANK; SO# - MATRIX SPIKE DUPLICATE; RB# - RINSE BLANK; FR# - FIELD REPLICATE; N# - NORMAL ENVIRONMENTAL SAMPLE; MS# - MATRIX SPIKE

(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME	SPECIAL INSTRUCTIONS
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME	

Distribution: Original accompanies shipment, copy to coordinator field files

URSF-075C/1 OF 1/CeICR/GCM

AIR SAMPLE
CHAIN OF CUSTODY RECORD

URS CORPORATION
77 GOODELL STREET
BUFFALO, NY 14203
PHONE: 716-856-5636

URS CONTACT: _____

PROJECT NUMBER	SITE NAME
SAMPLERS (PRINT/SIGNATURE)	

DELIVERY SERVICE: _____ AIRBILL NO.: _____

LAB _____

SHIPPING CONTAINER _____ of _____

PAGE _____ of _____

SAMPLE INFORMATION

LOCATION IDENTIFIER	SAMPLE DATE	SAMPLE TIME	SAMPLE ID	MATRIX CODE	CANISTER SIZE (LITERS)	CANISTER ID	FLOW CONTROLLER ID	INITIAL PRESSURE/ VACUUM (" Hg)	FINAL PRESSURE/ VACUUM (" Hg)	PRESSURE/VACUUM UPON LAB RECEIPT (" Hg)	REQUIRED ANALYSIS			REMARKS	SAMPLE TYPE CODE

MATRIX CODES: AA - AMBIENT AIR AI - INDOOR AIR AQ - FIELD QC AS - SUB-SLAB AIR GS - SOIL GAS

SAMPLE TYPE CODES: N# - NORMAL ENVIRONMENTAL SAMPLE FD# - FIELD DUPLICATE MS# - MATRIX SPIKE (# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME	SPECIAL INSTRUCTIONS
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME	

Distribution: Original accompanies shipment, copy to project file

TEST PIT LOG

URS
CORPORATION

PROJECT:	SHEET: 1 OF 1
CLIENT:	JOB NUMBER:
CONTRACTOR:	LOCATION:
DATE STARTED:	GROUND ELEVATION:
DATE COMPLETED:	OPERATOR:
TEST PIT NUMBER:	GEOLOGIST:
	GROUNDWATER:

DEPTH	SAMPLE NO.	SAMPLE TYPE	DESCRPITION
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

COMMENTS:

URS Corporation									GEOPROBE LOG
									BORING NO:
PROJECT:									SHEET:
CLIENT:									JOB NO.:
BORING CONTRACTOR:									BORING LOCATION:
GROUNDWATER: Not encountered					CAS.	SAMPLER	CORE	TUBE	GROUND ELEVATION:
DATE	TIME	LEVEL	TYPE	TYPE					DATE STARTED:
				DIA.					DATE FINISHED:
				WT.					DRILLER:
				FALL					GEOLOGIST:
				* POCKET PENETROMETER READING					REVIEWED BY:

	SAMPLE					DESCRIPTION				REMARKS	
DEPTH FEET	STRATA	NO.	TYPE	BLOWS PER 6"	REC% RQD%	COLOR	CONSIST HARD	MATERIAL	USCS	PID	
5											
10											
15											
20											
25											
30											
35											

Comments: Boring advanced with Geoprobe unit mounted on a track-mounted using a 2" diameter by 4' long Macro Core sampler.	PROJECT NO.
	BORING NO.

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.0	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.0	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x ___)	=	0	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS											
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											

COMMENTS:

WELL PURGING LOG

URS Corporation

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.00	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.00	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 3)	=	0.00	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS	INITIAL										INSTRUMENT
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											
TURBIDITY (NTU)											
DISSOLVED OXYGEN											
WATER LEVEL											
TIME											

COMMENTS:

LOW FLOW GROUNDWATER PURGING/SAMPLING LOG

Project: _____ Site: _____ Well I.D.: _____

Date: _____ Sampling Personnel: _____ Company: URS Corporation

Purging/ Sampling Device: _____ Tubing Type: _____ Pump/Tubing Inlet Location: Screen midpoint

Measuring Point: Below Top of Riser Initial Depth to Water: _____ Depth to Well Bottom: _____ Well Diameter: _____ Screen Length: _____

Casing Type: PVC Volume in 1 Well Casing (liters): _____ Estimated Purge Volume (liters): _____

Sample ID: _____ Sample Time: _____ QA/QC: _____

Sample Parameters: _____

PURGE PARAMETERS

TIME	pH	TEMP (^{0}C)	COND. (mS/cm)	DISS. O_2 (mg/l)	TURB. (NTU)	Eh (mV)	FLOW RATE (ml/min.)	DEPTH TO WATER (btor)
Tolerance:	**0.1**	**---**	**3%**	**10%**	**10%**	**+ or - 10**	**---**	

Information: WATER VOLUMES--0.75 inch diameter well = 87 ml/ft; 1 inch diameter well = 154 ml/ft; 2 inch diameter well = 617 ml/ft; 4 inch diameter well = 2470 ml/ft ($vol_{cyl} = \pi r^2 h$)

Remarks:

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

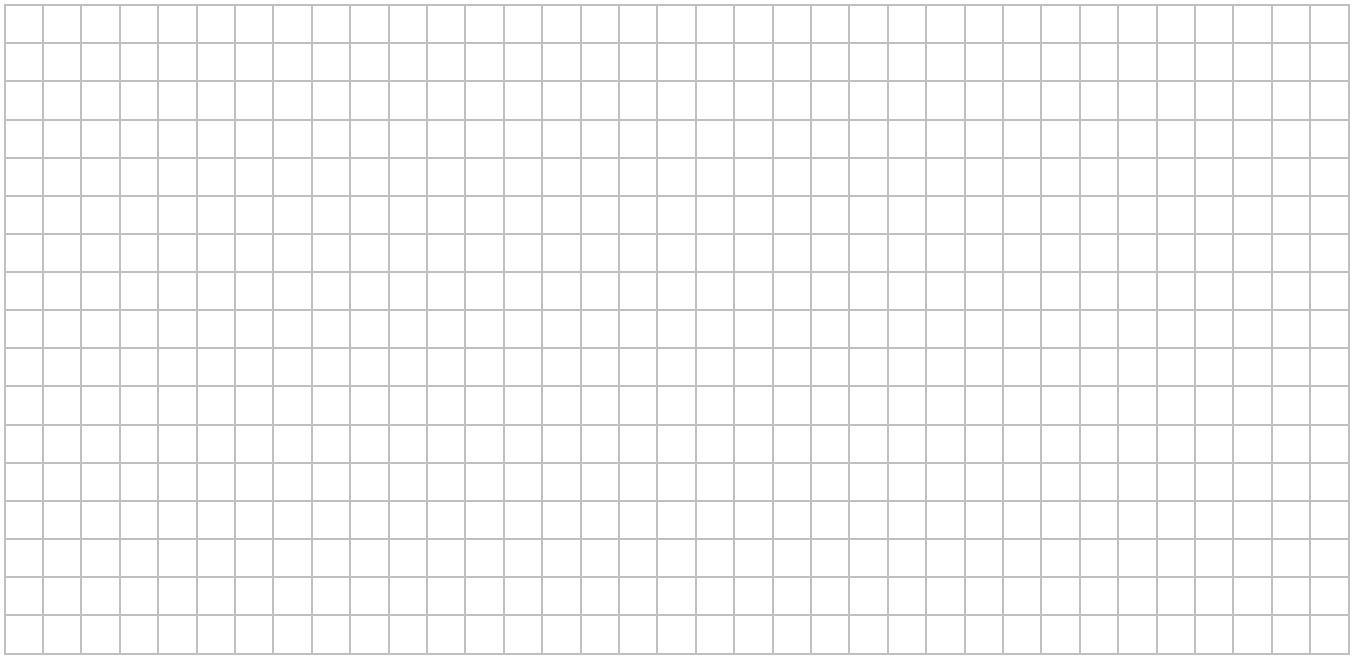
c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

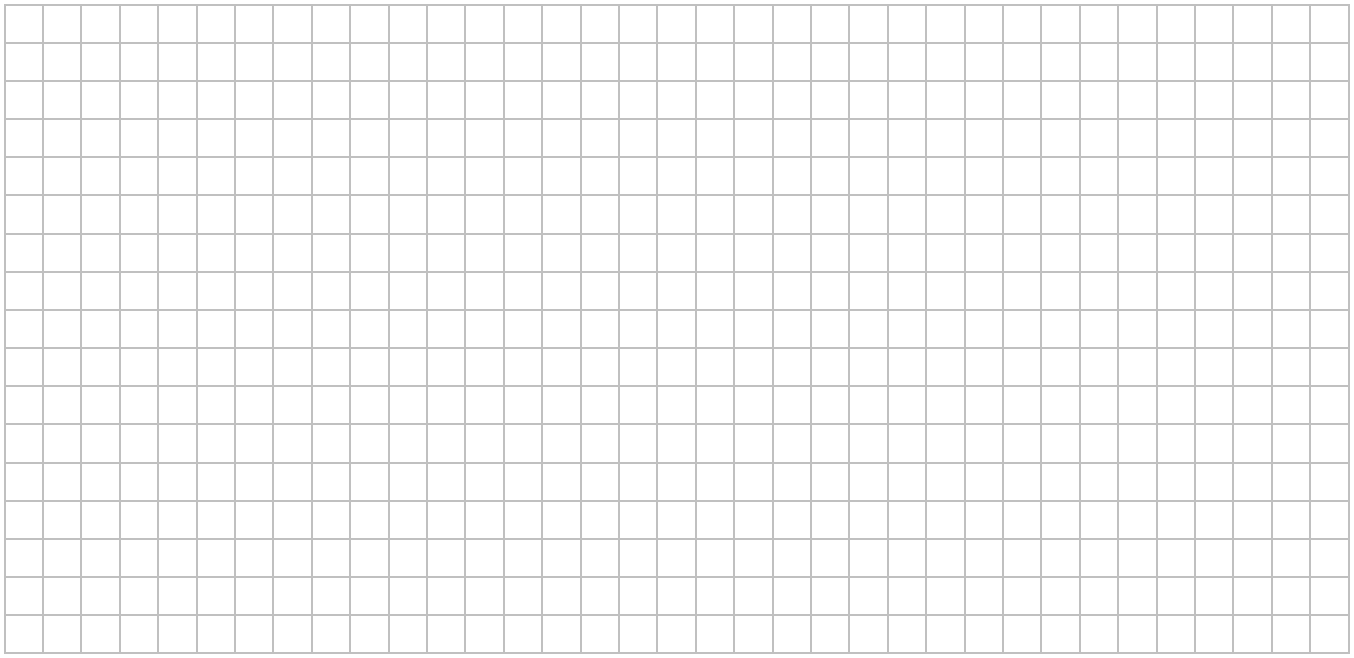
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



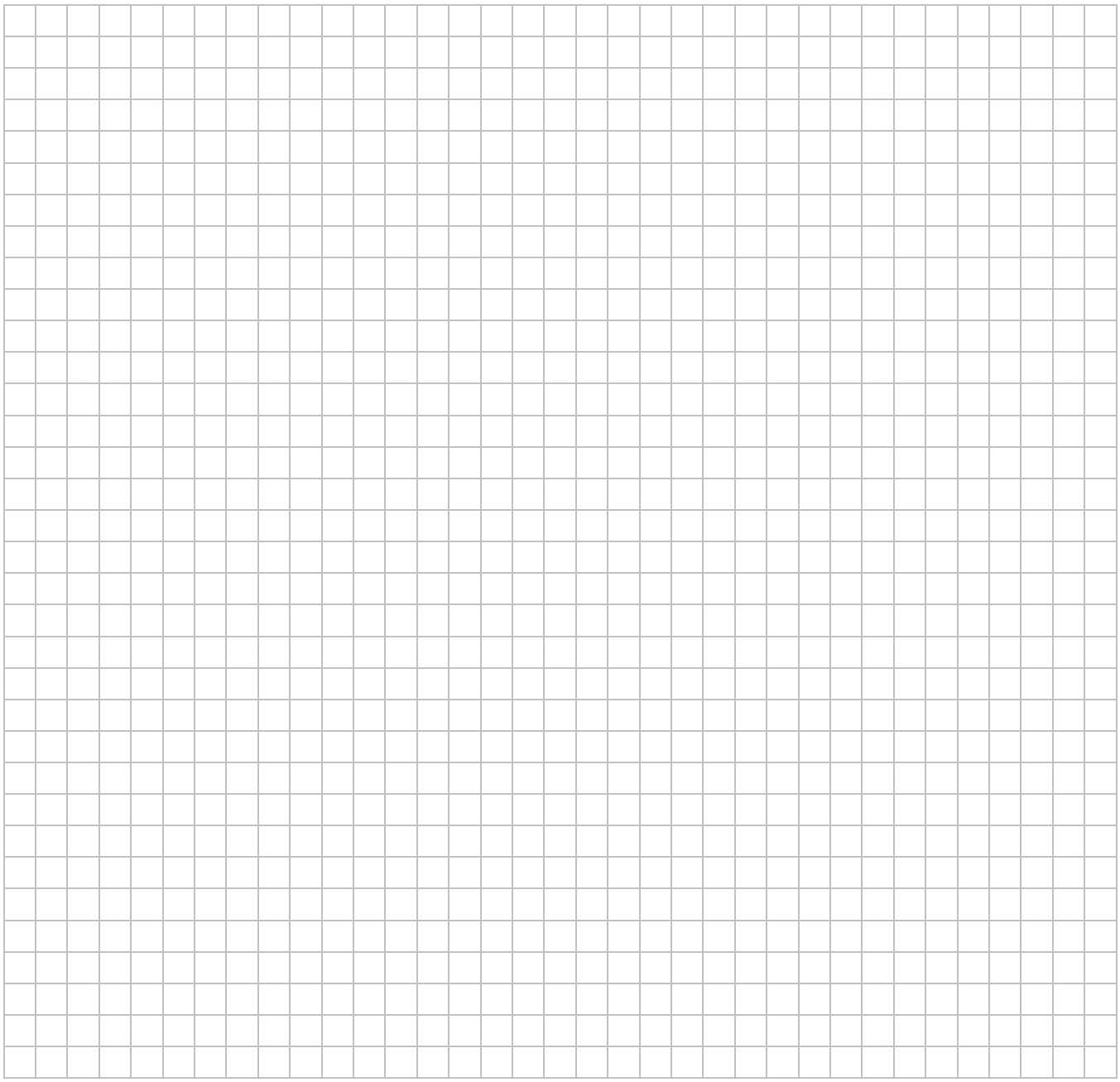
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

INDOOR AIR QUALITY INVESTIGATION

Instructions for Residents

(To be followed starting at least 24 hours prior to and during the sampling event)

- Do not open windows, fireplace openings or vents.
- Do not keep doors open.
- Do not operate ventilation fans or air conditioners.
- Do not smoke in the house.
- Do not use wood stoves, fireplaces or auxiliary heating equipment (e.g., kerosene heaters).
- Do not paint or varnish.
- Do not use cleaning products (e.g., bathroom cleaners, furniture polish, appliance cleaners, all-purpose cleaners, floor cleaners or other cleaners with petroleum or oil-based products).
- Do not use cosmetics, including hair spray, nail polish, nail polish remover, perfume/cologne, etc.
- Do not use air fresheners, scented candles or odor eliminators.
- Do not partake in indoor hobbies that use solvents or other volatile chemicals.
- Do not apply pesticides.
- Do not store containers of gasoline, oil or petroleum-based or other solvents within the house or attached garage (except for fuel oil).
- Do not operate or store automobiles in an attached garage.
- Do not operate lawn mowers, snow blowers or pave with asphalt.
- Do not bring home items that have been dry-cleaned.

Summa Canister Data Sheet

Site: Hillcrest

Samplers:

Date:

Sample #					
Location					
Summa Canister ID					
Flow Controller ID					
Additional Tubing Added	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much
Purge Time (Start)					
Purge Time (Stop)					
Total Purge Time (min)					
Purge Volume					
Initial Tracer Gas Results					
CH4 (ppm)					
O2 (%)					
H2S (ppm)					
CO2 (ppm)					
Pressure Gauge - before sampling					
Sample Time (Start)					
Sample Time (Stop)					
Total Sample Time (min)					
Pressure Gauge - after sampling					
Sample Volume					
Canister Pressure Went To Ambient Pressure?	YES / NO	YES / NO	YES / NO	YES / NO	YES / NO
Final Tracer Gas Results					
Weather 24 hours before and during sampling					

General Comments:

APPENDIX I – REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION FOR 315 NORTH MEADOW STREET SITE

TABLE OF CONTENTS

APPENDIX J – PERMITS AND/OR PERMIT EQUIVALENT

No permits are required for the management of this Site.

APPENDIX K – RESPONSIBILITIES OF OWNER AND REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan ("SMP") for the 315 North Meadow Street site (the "site"), number 755014, are divided between the site owner(s) and a Remedial Party, as defined below. The site owner is currently listed as James John LLC and Stone Garden Corporation/Angelo Dry Cleaners is the site operator.

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

James John, LLC
C/O Thaler & Thaler, Attention Richard B. Thaler, Esq.
309 North Tioga Street
Ithaca, New York 14850

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in an Environmental Easement remain in place and continue to be complied with. The owner shall provide a

written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. In the event that damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.

6) In the event some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and (ii) coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 2.4 of the SMP. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) The owner will maintain the cover systems and SSD systems on behalf of the RP. The RP remains ultimately responsible for maintaining the engineering controls.

9) Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.

10) Until such time as the NYSDEC deems the drinking water treatment system unnecessary, the owner shall operate the drinking water treatment system, pay for the utilities and report any maintenance issues to the RP and the NYSDEC.

11) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the

NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3- Notifications of the SMP.

7) The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site.

8) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

9) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.