FORMER SPEEDY'S CLEANERS

MONROE COUNTY

BRIGHTON, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 828128

Prepared for:

New York State Department of Environmental Conservation

Albany, New York

Prepared by:

MACTEC Engineering and Geology, P.C.
Portland, Maine

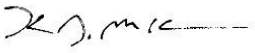
Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date
0	December 2022	Original	12/05/2022

DECEMBER 2022

CERTIFICATION STATEMENT

I Kevin McKeever certify that I am currently a Qualified Environmental Professional as in defined in 6 NYCRR Part 375 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).



QEP

12/14/2022 DATE

SITE MANAGEMENT PLAN
FORMER SPEEDY'S CLEANERS SITE
SITE # 828128

WORK ASSIGNMENT NO. D009809-16

Prepared for:

New York State Department of Environmental Conservation
Albany, New York

Prepared by:

MACTEC Engineering and Geology, P.C.
Portland, Maine

MACTEC Project No. **3616206120**

DECEMBER 2022

Submitted by:



Jean Firth, P.G.
Program Manager

Approved by:



Kevin J. McKeever, P.E., P.G.
Project Manager

TABLE OF CONTENTS

TABLE OF CONTENTS I

ES EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1-1

1.1 GENERAL 1-1
1.2 REVISIONS 1-2
1.3 NOTIFICATIONS 1-3

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS 2-1

2.1 SITE LOCATION AND DESCRIPTION 2-1
2.2 PHYSICAL SETTING 2-1
2.2.1 Land Use 2-1
2.2.2 Geology 2-2
2.2.3 Hydrogeology 2-3
2.3 INVESTIGATION AND REMEDIAL HISTORY 2-3
2.4 REMEDIAL ACTION OBJECTIVES 2-6
2.5 REMAINING CONTAMINATION 2-7
2.5.1 Soil 2-7
2.5.2 Groundwater 2-8
2.5.3 Soil Vapor 2-9

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN 3-1

3.1 GENERAL 3-1
3.2 INSTITUTIONAL CONTROLS 3-1
3.3 ENGINEERING CONTROLS 3-3
3.3.1 Cover 3-3
3.3.2 Sub-slab Depressurization Systems 3-3
3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems 3-3
3.3.3.1 - Sub-Slab Depressurization (SSD) System 3-4
3.3.3.2 - Monitoring Wells associated with Bioremediation and Monitored Natural Attenuation 3-4

4.0 MONITORING AND SAMPLING PLAN 4-1

4.1 GENERAL 4-1
4.2 SITE – WIDE INSPECTION 4-2
4.3 OFF-SITE SUB-SLAB DEPRESSURIZATION SYSTEM 4-3
4.3.1 Scope 4-3
4.3.2 System Start-Up and Testing 4-3
4.3.3 System Operation: Routine Operation Procedures 4-4
4.4 POST-REMEDIATION MEDIA MONITORING AND SAMPLING 4-4
4.4.1 Groundwater Sampling 4-6

4.3.2 Monitoring and Sampling Protocol 4-8

5.0 OPERATION AND MAINTENANCE PLAN 5-1

5.1 GENERAL 5-1
5.2 REMEDIAL SYSTEM (OR OTHER ENGINEERING CONTROL) PERFORMANCE CRITERIA 5-1
5.3 OPERATION AND MAINTENANCE OF THE SSD SYSTEM 5-1
5.3.1 System Start-Up and Testing 5-1
5.3.2 Routine System Operation and Maintenance 5-2
5.3.3 Non-Routine Operation and Maintenance 5-2
5.3.4 System Monitoring Devices and Alarms 5-2
5.4 FIRE SAFETY 5-3

6.0 PERIODIC ASSESSMENTS/EVALUATIONS 6-1

6.1 CLIMATE CHANGE VULNERABILITY ASSESSMENT 6-1
6.2 GREEN REMEDIATION EVALUATION 6-2
6.2.1 Timing of Green Remediation Evaluations 6-3
6.2.2 Frequency of Sampling and Other Periodic Activities 6-3
6.2.3 Metrics and Reporting 6-4

7.0 REPORTING REQUIREMENTS 7-1

7.1 SITE MANAGEMENT REPORTS 7-1
7.2 PERIODIC REVIEW REPORT 7-3
7.3 CERTIFICATION OF INSTITUTIONAL AND ENGINEERING CONTROLS 7-4
7.4 CORRECTIVE MEASURES WORK PLAN 7-5

8.0 REFERENCES 8-1

SUMMARY OF GREEN REMEDIATION METRICS FOR SITE MANAGEMENT

TABLE OF CONTENTS (Continued)

List of Tables

Page

Table 1.1 Notifications 1-4
Table 2.1 Groundwater PCE Concentrations 2-8
Table 4.1 Post Remediation Sampling and Scheduling Requirements 4-5
Table 4.2 Monitoring Well Construction Details 4-7
Table 7.1 Schedule of Interim Monitoring/Inspection Reports 7-1

List of Figures

Page

Figure 1.1 Site Location Map F-1
Figure 1.2 Site Features Map… F-2
Figure 2.1 Groundwater Contour Map F-3
Figure 3 Groundwater Results Map F-4

TABLE OF CONTENTS (Continued)

List of Appendices

Page
Appendix A - Environmental Easement A-1
Appendix B - Monitoring Well Boring and Construction Logs B-1
Appendix C - Excavation Work Plan/ NYSDEC DER-10 .....C-1
Appendix D - FEMA Flood Insurance Maps..... D-1
Appendix E - Health and Safety Plan E-1
Appendix F - QAPP/SOPs F-1
Appendix G - Site Management Form G-1

List of Acronyms

CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
EWP	Excavation Work Plan
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
OM&M	Operation, Maintenance and Monitoring
PRR	Periodic Review Report
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SSD	Sub-slab Depressurization System
SVI	Soil Vapor Intrusion

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: Site No. 828128

Former Speedy's Cleaners, 2150 Monroe Ave, Brighton, NY

Institutional Controls:	1. The property may be used for restricted residential, commercial, and industrial use.
	2. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Monroe 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.
	3. Groundwater and other environmental or public health monitoring must be performed as defined in the SMP.
	4. Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP.
	5. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP.
	6. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP.
	7. 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 this Environmental Easement.

Site Identification: Site No. 828128

Former Speedy's Cleaners, 2150 Monroe Ave, Brighton, NY

Engineering Controls:	1. All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP).
	2. All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP.
	3. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP.
	4. The continued operation and maintenance of the SSDS of the Site building. Note that the property owner installed and operates the SSDS at the Site building.

Inspections:	Frequency
1. SSDS	Annually (by property owner)
Monitoring:	
1. Groundwater Monitoring Wells MW- 202, MW-203S, MW-204S, MW-205S, MW-206, MW-211, and MW-212.	Semi-Annually
2. Soil Vapor Intrusion Evaluation (if necessary)	As needed
Reporting:	
1. 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 Former Speedy's Cleaners located at 2150 Monroe Ave, Brighton, New York (hereinafter referred to as the "Site"), Parcel ID Number 137.14-2-9 (Figure 1.1). The area surrounding the Site is a densely populated mix of commercial and residential properties. The Site is listed as a Class 2 inactive hazardous waste disposal site in the New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Disposal Site Remedial Program. A Record of Decision (ROD) was issued in March 2010 (NYSDEC, 2010). A figure showing the site location and boundaries of this site is provided in Figure 1.2. 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 Monroe 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 and off-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 and 6 NYCRR 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 this SMP in Table 1.1.

This SMP was prepared by MACTEC, 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 NYSDEC SMP Template (NYSDEC, 2022), 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. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown 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 project manager 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:

1. 60-day advance notice of any proposed changes in site use that are required under 6 NYCRR Part 375 and/or Environmental Conservation Law.

2. 7-day advance notice of any field activity associated with the remedial program.

3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

4. 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.

5. Notice within 48 hours of any non-routine maintenance activities.

6. 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.

7. 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:

8. 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.
9. 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 1.1 includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information.

Table 1.1: Notifications*

Name	**Contact Information**	**Required Notification****
Charles Gregory, NYSDEC Project Manager	(518) 402-9813; charles.gregory@dec.ny.gov	All Notifications
Michael Cruden, Director, Remedial Bureau E	(518) 402-9825; Michael.cruden@dec.ny.gov	All Notifications
Jeffrey Dyber, Remedial Bureau E	(518) 402-9621; jeffrey.dyber@dec.ny.gov	Notifications 1 and 8
Mark Sergott, NYSDOH Project Manager	(518)402-7860; mark.sergott@health.ny.gov	All Notifications

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

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located at 2150 Monroe Avenue in a mixed residential and commercial area in the Town of Brighton, Monroe County (Figure 1.1) and is identified as Section 137, Block 14, Lot 2-9 on the Monroe County Tax Map. The 0.15 acre property is located along the intersection of Monroe Avenue (NYS Route 31) and Hampshire Drive. The property is bordered immediately to the west and north by a combination of single and multi-tenant residential buildings. Monroe Avenue and various commercial and retail establishments border the site to the south and east. A figure showing the site location and boundaries of this site is provided in Figure 1.2.

The boundaries of the site are more fully described in Appendix A Environmental Easement. The owner(s) of the site parcel(s) at the time of issuance of this SMP is:

Fomer Speedy's Cleaners
(Attn: John A. Casciani)
411 Sundance Trail
Webster, NY 14580

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: an approximate 3,000 square foot, two story brick and block construction building with a partial basement. With the exception of a few small grassy areas, the remainder of the site is covered with an asphalt parking lot and is currently utilized for restricted residential and commercial uses. Site occupants include a salon on the first floor and a single-family residence on the upper floor.

The site is bordered to the north and east by single family and multi-unit residential properties. A multi-unit residential property is located east of the site across Monroe Avenue, and a commercial property (law office) is located south of the site across Hampshire Drive. The site is located approximately 450 feet east of a petroleum spill (NYSDEC Spill Number 0306131) that occurred at the former Newcomb Oil/Citgo Gasoline Station located at 2087 Monroe Avenue and approximately 350 feet east of a Class 2 Inactive Hazardous Waste Disposal Site (HW ID No. 8-28-120) identified as the Carriage Cleaners site at 2101 Monroe Avenue.

2.2.2 Geology

The geology beneath and near the Former Speedy's Cleaners Site directly influences the distribution and ability for contaminants to migrate from the site. Site geology consists of a thin veneer of sandy glacial till (overburden beneath the site) comprised of loose to dense sand with some silt and gravel overlying a medium dark gray dolomite (bedrock beneath the site) of the Lockport Group. The thickness of overburden ranges from approximately 9 feet to 15 feet. The upper 1 to 3 feet of bedrock consists of a weathered zone that is underlain by a shallow fractured bedrock zone with a thickness of approximately 6 to 15 feet.

The site investigation data suggest that the top of the bedrock surface is an irregular erosional surface. The presence of a bedrock high northeast of the Former Speedy's Cleaners Site and a bedrock trough north of the site (northeast of the Carriage Cleaners Site), with an approximate northwest to southeast orientation, appears to influence the local groundwater flow direction.

2.2.3 Hydrogeology

The depth to groundwater ranges from approximately 6 feet to 10 feet below grade and data suggests a hydraulic connection exists between the overburden and the shallow bedrock groundwater systems (the groundwater table in the vicinity of the site is present in either overburden or weathered/fractured bedrock, depending on the depth to water and the bedrock elevation). The majority of the groundwater monitoring wells at and in the vicinity of the site are constructed with screens straddling the overburden and upper shallow weathered bedrock. The horizontal groundwater seepage velocity in this zone is estimated to range from approximately 0.4 feet per day (feet/day) to 1.7 feet/day, or approximately 150 feet per year (feet/year) to 600 feet/year, with flow primarily to the east and northeast.

A groundwater contour map with groundwater elevation data is shown on Figure 2.1. Available groundwater monitoring well construction logs are provided in Appendix B.

The nearest surface water body is a small unnamed tributary to the Allen Creek. The unnamed tributary is located over 1,000 feet northwest of the site and flows toward the east. The majority of surface water runoff from the site is captured by the Monroe County Pure Waters stormwater collection system.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

The Speedy's Cleaners operated at the site for approximately 28 years from 1953 to 1981. Between 1982 and 1999, and prior to the current property use as the beauty salon, the site was used for Lasser's Home Products. A property inspection performed by the Monroe County Health Department (MCHD) of the Former Speedy's Cleaners on June 29,

1977, documented the use of approximately 550 gallons of tetrachloroethene (PCE) per year (Labella, 1999).

In April 2005, the NYSDEC first identified the site as a Potential (P) site during investigation activities conducted at the nearby Carriage Cleaners site (828120) and Citgo Gasoline Station petroleum spill (Spill No. 0306131). During the Remedial Investigation (RI)/Feasibility Study (FS) conducted by the NYSDEC at the Carriage Cleaners site, direct push soil borings and bedrock wells were installed in the vicinity of the Former Speedy's Cleaners (O'Brien and Gere Engineers, Inc., 2007). The Department collected groundwater, soil vapor and indoor air samples at the site and surrounding properties (NYSDEC, 2004). Based on results of the samples collected it was determined that the Speedy's Cleaners Site was a separate source of contamination from the Carriage Cleaners Site, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York in July 2007.

Based on the soil vapor and indoor air sample results and the recommendation to mitigate for vapor intrusion, the site property owner installed a sub-slab depressurization system at the property in March 2007.

To evaluate the nature and extent of contamination at the Site, an RI/FS was conducted at the Site between 2008 and 2010. The RI/FS included direct push soil borings, overburden, and bedrock well installations, and groundwater sampling. Soil samples collected at the Site indicate the presence of PCE at concentrations above the NYSDEC Part 375 Soil Cleanup Objectives for unrestricted use. The maximum concentration detected (830 milligrams per kilogram [mg/Kg]) indicated that PCE may have been present as a DNAPL in site soils. The majority of the PCE detections in exceedance of SCOs, and the highest concentrations, were detected at, or below the water table (located between six and eight feet bgs at the Site). Although a release mechanism and entry point of the PCE was not identified (e.g., surface spill location or leaking pipe), the release was assumed to have occurred into soil below the Site building or immediately adjacent to the Site building (MACTEC, 2010).

PCE and its breakdown products TCE and cis-1,2-DCE were detected at concentrations of 7,600 micrograms per liter (µg/L), 170 µg/L, and 130 µg/L, respectively, in groundwater samples from monitoring well MW-212, located adjacent to the Site building. Although the Carriage Cleaners site was a known source of these same chlorinated solvents in groundwater, the Former Speedy's Cleaners site was interpreted to be a separate source of PCE. This was based on the lower concentrations of PCE in groundwater samples immediately upgradient of the Site than in the groundwater sample from MW-212, the anticipated primary flow path of groundwater from Carriage Cleaners Site slightly north of the Former Speedy's Cleaners building, and the detection of PCE in soil at concentrations above the SCO for the protection of groundwater at several locations at the Site (MACTEC, 2010).

Based on the 2010 RI/FS, a Record of Decision (ROD) was finalized by the NYSDEC in March 2010, with the remedy selected being soil source removal followed by the injection of biological amendments (NYSDEC, 2010). In March 2011, 91 tons of soil were excavated from two areas adjacent to the Former Speedy's building to the northeast and southeast sides. The excavations were approximately 10 ft by 10 ft and completed to the top of bedrock approximately 11 feet below ground surface (bgs) (NYSDEC, 2013). Due to utilities encountered some soils above SCOs were left in place. The excavations were treated with Regenesis hydrogen release compound (HRC) and HRC primer prior to backfilling. Injection points were installed in both excavations during backfilling operations (MW-211A and MW-212A). In addition, monitoring wells MW-211 and MW-212 were removed during the excavation activities. Replacement wells with the same names were installed downgradient from each excavation to replace MW-211 and MW-212. A third well, MW-213, was also installed approximately 100 ft east of the Former Speedy's building downgradient from the removal areas.

Injections of Regenesis bio-amendment 3DMe and HRC were completed in March 2011, May 2011, and September 2011 (NYSDEC, 2011). Subsequent groundwater

monitoring events indicated groundwater contaminant concentrations still exceeded NYS ambient water quality standards and the NYSDEC completed another injection event in June 2015 consisting of the injection of Regenesis 3DMe and Chemical Reducing Solution, an in-situ chemical reduction solution (Empire Geo-services, 2017). This was followed by groundwater sampling in Jan-Feb 2016. Additional groundwater sampling of site wells conducted in 2021 to evaluate the potential ongoing effects of the bio-amendments continued to show that groundwater contaminant concentrations were above NYS ambient water quality standards (NYSDEC, 1998).

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Record of Decision or Decision Document dated March 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.

RAOs for Environmental Protection

- Restore ground water aquifer to meet ambient groundwater criteria, to the extent practicable.
- Prevent the discharge of contaminants to surface water.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in 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 a site.

2.5 Remaining Contamination

2.5.1 Soil

Due to utilities encountered and proximity to the building foundation, some soils with concentrations of chlorinated compounds above SCOs for the protection of groundwater were left in place after completion of the 2011 soil excavations. In addition, although not identified in previous sampling, it is anticipated that some residual soil contamination is present below the building foundation.

Exposure to remaining contamination at the site is also prevented by following the Excavation Work Plan (EWP) provided in Appendix C. The EWP outlines the procedures required to be implemented in the event sub-surface work is conducted at the site. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) including adhering to a NYSDOH

Generic Community Air Monitoring Plan (CAMP) located in Appendix 1A and 1B of DER-10 / Technical Guidance for Site Investigation and Remediation The NYSDEC DER-10 is also included in Appendix C.

2.5.2 Groundwater

Although injections of Regenesis bio-amendment 3DMe and HRC and Chemical Reducing Solution (CRS) (an in-situ chemical reduction [ISCR] solution) were conducted to help drive reductive dechlorination in the groundwater, sampling conducted in 2021 continued to show groundwater concentrations above NYS ambient water quality standards. The table below summarizes groundwater tetrachloroethene (PCE) concentrations detected in 2021 in monitoring wells onsite and adjacent to the Site.

Table 2.1 Groundwater Monitoring Well PCE Concentrations

Date	Groundwater PCE Concentration (µg/L)												
	MW-202	**MW-202I**	**MW-203S**	**MW-204S**	**MW-205S**	**MW-206**	**MW-206S**	**MW-210**	**MW-211**	**MW-212**	**MW-213**	**HA-119**	**OW-1**
3/30/2021*	6.3J	ND	-	18	0.071J	-	ND	16	2,100	3,500	53	ND	150
8/17/2021	4.8J	-	0.48J	15	ND	ND	-	-	-	1,900	-	-	-
10/25/2021**	11	-	0.06J	17	0.096J+	ND	-	-	-	2,500	-	-	-

Notes:

- - indicates not sampled
- ND – non-detect
- *Sample for well OW-1 was collected on 3/29/2021; Samples for MW-204S, MW-206S, MW-211 were collected on 3/31/2021; Samples for MW-202, MW-201I, MW-210, MW-212 and MW-213 were collected on 4/1/2021
- ** Samples for MW-203S and MW-205S were collected on 10/26/2021
- Qualifiers: J = result is estimated; J+ = estimated biased high during data validation

In addition to PCE, the breakdown products TCE, cis-1,2-dichloroethene (cis-DCE) and vinyl chloride (VC) continue to exceed groundwater standards.

Tables 2.2 and 2.3 as well as Figure 3 summarize the results of all samples of groundwater that exceed the Standards, Criteria, and Guidelines (SCGs) after completion of the remedial action. The extent of PCE concentrations in groundwater in October 2021 are demonstrated in Figure 4.

2.5.3 Soil Vapor

Soil vapor intrusion (SVI) sampling has not been conducted since the remedial action was completed; however, based on the continued presence of high concentrations of chlorinated compounds in groundwater adjacent to the Site building, it is anticipated that soil vapor at the Site building has the potential to result in indoor air concentrations above NYSDOH guidelines. SVI potential at the Site building was previously mitigated by an SSDS system installed by the Site property owner.

Additional SVI sampling conducted at nearby properties hydraulically downgradient from the Site has not indicated the potential for SVI to result in indoor air concentrations above guidance values.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (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 project manager.

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, 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 project manager.

3.2 Institutional Controls

A series of ICs is required by the 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 restricted residential and commercial uses. 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. These ICs are:

- The property may be used for: restricted residential and commercial, and industrial 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 NYSDOH or the Monroe 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, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Cover

The site is primarily covered with asphalt and a building that prevents exposure to contaminated soil. This is not a designed, engineered cover.

3.3.2 Sub-slab Depressurization Systems

Exposure to contaminated indoor air resulting from vapor intrusion has been mitigated with the installation of an SSDS at the Site building. This system was installed in 2007 by the property owner. The system consists of a suction point in the basement slab and a single fan on the northwest side of the site building. The fan runs continuously and does not require routine maintenance. Procedures for operating and maintaining the SSD system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP).

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. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning the SSD system equipment.

3.3.3.1 - Sub-Slab Depressurization (SSD) System

The active SSD system will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. The property owner installed, operates and maintains the SSDS in the building.

3.3.3.2 - Monitoring Wells associated with Bioremediation and Monitored Natural Attenuation

Groundwater monitoring activities to assess bioremediation and subsequent natural attenuation will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

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 project manager. 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 Program Plan and Program Field Activities Plan (MACTEC, 2020a).

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;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. The inspection will 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;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- 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 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:

- 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 project manager 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 defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager 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 Off-site Sub-slab Depressurization System

The individual SSD/ventilation systems are designed to create a vacuum below the building foundations. The major components of the systems include a sub-slab suction point (or crawl space ventilation point), a blower/fan, and a discharge pipe that vents the sub-slab vapor to above the building's roof line. Operation of the individual SSD systems started during the period 2003 to 2009.

4.3.1 Scope

The SSD/ventilation systems are designed to run continuously. Each system should be checked annually to verify it is working as designed (i.e., that the fan is running, and a vacuum is noted on the gauge). A general description of the system operations and maintenance requirements are included below.

4.3.2 System Start-Up and Testing

If the system needs to be restarted, the following steps should be conducted:

1. Prior to beginning start-up procedures, inspect to make sure that the PVC piping is connected along entire run, and sealed into the basement floor (or that crawl space is sealed). All floor penetrations should also be sealed.
2. Check fan to make sure electrical lines are properly connected and grounded.
3. Check manometer/vacuum gauge to check that no vacuum is measured.
4. Turn on power with switch located by fan (may be controlled by breaker).
5. Check manometer/vacuum gauge and see that system is producing a vacuum.
6. Check basement for sound of vacuum at potential cracks/floor penetrations. Seal if needed (can also do smoke test to check).

Set power switch to "OFF" position for normal shutdown.

4.3.3 System Operation: Routine Operation Procedures

The systems are self-sufficient and should run without operational oversight. Operation consists of annual monitoring of the system as described in Section 4.3. The SSD/ventilation system does not have controls. If issues are identified during monitoring (e.g., fan not running or reduction of vacuum), or as a result of a call from the resident, non-routine maintenance will be conducted.

Non routine maintenance could include items such as:

- Repair/replacement of broken pipes
- Repair/replacement of fan
- Sealing of new floor penetrations (e.g., new cracks or utility lines)

The off-site residential SSD/ventilation systems are being monitored by and maintained by the NYSDEC. To monitor these systems, the NYSDEC sends an annual letter to the owner or tenant of the property to remind them to check to see the fan is operational, to confirm that it is drawing a vacuum, and to report any issue to the NYSDEC so they can take care of any maintenance or repairs needed.

4.4 Post-Remediation Media Monitoring and Sampling

The effectiveness of the remedial actions previously implemented at the Site will be monitored through the collection and evaluation of groundwater quality within and hydraulically downgradient of the previous in-situ biological amendment injection area. Samples shall be collected from the groundwater monitoring wells on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in Table 4.1 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4.1 – Post Remediation Sampling Requirements and Schedule

Monitoring Well ID	Analytical		Sample Schedule
	VOCs (EPA 8260)	MNA Parameters	
Overburden Wells			
MW-206S			None
MW-211A			None
MW-212A			None
Shallow Bedrock/Overburden Interface Wells			
HA-112			None
HA-119			None
MW-201			None
MW-202	X	x	Semi-Annual
MW-203S	X		Semi-Annual
MW-204S	X		Semi-Annual
MW-205S	X	X	Semi-Annual
MW-206	X	X	Semi-Annual
MW-210			None
MW-211	X		Semi-Annual
MW-212	X	X	Semi-Annual
MW-213			None
Intermediate Bedrock Well			
MW-202I			None

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed annually to assess the performance of the remedy. If additional bioremediation is conducted, the list of wells below and the sampling frequency could change. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. Table 4.2 summarizes the wells identification number, as well as the purpose, location, and depths of the wells. Not all wells presented in Table 4.2 are sampled. As part of the groundwater monitoring, two upgradient well, three on-site wells and five downgradient wells are sampled to evaluate the effectiveness of the remedial method. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

Table 4.2 – Monitoring Well Construction Details

Monitoring Well ID	Northing	Easting	Ground Elevation (ft msl)	PVC Riser Elevation (ft msl)	Depth to Bottom (ft BTOR)	Bottom Elevation (ft msl)	Location/Use
Overburden Wells							
MW-206S	1139592.02	1421324.36	486.8	486.64	12.0	474.64	Upgradient
MW-211A	1139658.50	1421425.90	487.0	486.57	NA	NA	Injection Well-Former Source
MW-212A	1139626.73	1421423.87	484.6	486.25	NA	NA	Injection Well-Former Source
Shallow Bedrock/Overburden Interface Wells							
HA-112*	1139464.0	1421323.2	486.7	486.55	15.8	470.75	BKG -Upgradient
HA-119*	1139788.0	1421862.9	482.3	481.97	14.8	467.17	Downgradient
MW-201	1139683.63	1421442.87	486.7	486.33	NA	NA	Downgradient
MW-202	1139675.55	1421474.94	485.9	484.89	14.49	470.40	Downgradient
MW-203S*	1139893.9	1422253.7	478.8	478.51	14.7	463.81	Downgradient
MW-204S*	1139719.2	1422162.6	479.2	478.86	15.8	463.06	Downgradient
MW-205S*	1139544.9	1421827.3	482.4	482.05	14.56	467.49	Downgradient
MW-206	1139588.95	1421327.16	486.8	486.74	19.20	467.54	Upgradient
MW-210	1139671.22	1421245.63	487.0	486.78	18.0	468.78	Downgradient
MW-211++	1139653.59	1421434.22	486.7	485.96	14.4	471.56	Adjacent Former Source
MW-212++	1139621.36	1421428.00	485.9	485.44	11.85	473.59	Adjacent Former Source
MW-213++	1139641.57	1421457.47	485.6	485.02	12.7	472.32	Downgradient
Intermediate Bedrock Well							
MW-202I	1139666.58	1421471.08	485.8	485.39	49.6	435.79	Downgradient

Notes:
Horizontal Coordinates reference to the New York State Plane Coordinate System, West Zone NAD 83/96. Vertical Datum is NAVD88.

Elevations in feet above mean sea level (ft msl).

Northern/Eastern/Elevation Accuracy: Survey completed by Patriot Design and Consulting 2021.

*Survey completed by Popli Engineers on 8/3/2006 or 3/30/2009.

ft BTOR = feet below top of riser

NA = not available

++ = Available records do not indicate if these wells are overburden or overburden/interface wells.

Available monitoring well construction logs are included in Appendix B of this document.

If biofouling or silt accumulation occurs in the on-site and/or off-site 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 project manager 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 project manager. 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 project manager.

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

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

4.4.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling logs. Other observations (e.g., groundwater monitoring well integrity) 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 Quality Assurance Program Plan and Program Field Activities Plan (MACTEC, 2020a).

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the SSD system at the Site building;
- Will be updated periodically to reflect changes in site conditions or the manner in which the SSD system is operated and maintained.

5.2 Remedial System (or other Engineering Control) Performance Criteria

The SSD System installed at the Site building is designed to create a minimum vacuum below the entire building footprint. The vacuum is created by a fan installed on the exterior of the building that is designed to run uninterrupted. The fan is connected by PVC pipe to a suction point located in the basement floor. A liquid manometer is present on the pipe above the suction point that indicates the vacuum in inches of water column. Performance of the system is monitored by viewing the manometer and ensuring the vacuum observed is within the parameters marked on the manometer by the installer.

5.3 Operation and Maintenance of the SSD System

The following sections provide a description of the operations and maintenance of the SSDS.

5.3.1 System Start-Up and Testing

They SSD system is design to run continuously. If the system is shut down, it should be turned back on and the vacuum measurement on the liquid manometer observed. If the vacuum is below original design parameters, the building floor should be evaluated for new/unsealed cracks in the concrete or damaged pipes that could be short circuiting the

system. If the floor is sealed and the system components are in good repair, additional pressure field testing can be conducted across the basement floor to ensure the vacuum created meets design specifications.

The system testing described above will be conducted if, in the course of the SSD system lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

5.3.2 Routine System Operation and Maintenance

The SSDS is designed to run continuously with little to no maintenance needs. The system should be evaluated at a minimum annually to ensure:

- The fan is running and the vacuum measurement on the liquid manometer is within design criteria.
- There are no new/unsealed cracks on the basement floor (or slab on grade floor).
- The system components (PVC pipes, floor seal, fan, couplings) are in good repair.
- The fan exhaust extends above the roofline and there are no new windows or other openings within 10 feet of the exhaust.

5.3.3 Non-Routine Operation and Maintenance

Non routine maintenance will be conducted in the event the system or system components are broken or damaged. If the SSDS fan is found to be non-functioning, it can be replaced by the installer without removing the rest of the system.

5.3.4 System Monitoring Devices

As stated above, the SSDS is installed with a liquid manometer to gauge the vacuum created by the fan. If, upon inspection, there is no vacuum shown on the manometer, than applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

To monitor these systems, the NYSDEC sends an annual letter to the owner or tenant of the property to remind them to check to see the fan is operational, to confirm that

it is drawing a vacuum, and to report any issue to the NYSDEC so they can take care of any maintenance or repairs needed. Unscheduled inspections may take place when a suspected failure of the SSD/ventilation system has been reported, or an emergency occurs that is deemed likely to affect the operation of the system.

5.3. Fire Safety

This section will include descriptions of all fire protection and life safety systems, as well as maintenance, inspection, and record keeping requirements. Topics include, but are not limited to:

- State or local fire inspections
- Fire extinguishers – monthly and annual inspections
- Emergency lighting – 90-minute test
- Sprinklers – monthly and annual inspections
- Emergency exits – free from debris
- Alarm system – local or broadcast
- Electrical system.

The contents of this section will meet or exceed the minimum requirements for building fire protection and life safety systems as described in the Fire Code of New York State. All fire safety items shall comply with federal and state laws as well as local ordinances and building codes. The maintenance and inspections shall conform to NFPA 1584 guidance.

Include in this section:

The remedial party will conduct an annual facility walk with the local fire chief and/or fire suppression team. The site walk will allow for the addition of the facility to any local preplanning efforts. The NYSDEC project manager will be provided with the local fire chief's/fire suppression team's recommendations as soon as they become available. Following review, the NYSDEC project manager may direct the remedial party to implement the recommendations and/or revise the SMP.

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. The FEMA Flood Insurance Map for the site is included in Appendix D.

Because the Site and surrounding area is fairly flat and urbanized, and with the exception of an SSDS there are no active remedial systems in place, the Site is considered fairly resilient to climate change. However, a vulnerability assessment will be conducted annually as part of the annual inspection. This assessment will include an evaluation of the following potential vulnerabilities:

- Site Drainage and Storm Water Management: With the exception of minor grass strips along the northwestern and northeastern edge of the site, the property is covered with the building footprint and asphalt parking. Rainwater primarily flows over the asphalt to storm drains located on Monroe Avenue and Hampshire Drive. Roof drains, where present, discharge to the subsurface to the northwest of the Site building. Although not anticipated, if the municipal

sewer lines reach capacity during extreme events, or become clogged, it could be possible for water to flood. This could result in water flooding the building basement and possibly causing a mounding of groundwater within the residual source area. The vulnerability assessments should therefore include review of adjacent storm drains for clogging.

- Erosion: The site is primarily covered with asphalt and therefore less susceptible to erosion. Grass areas are at the same elevation as the asphalt and therefore there is low chance of erosion during periods of severe rain events. The vulnerability assessment should include evaluation of asphalt at the site to ensure large cracks have not formed that could result in erosion of the surface cover during severe rain events.
- Electricity: There is an SSDS located at the Site building that runs continuously to prevent vapor intrusion of site related contaminants. In the event of power loss and/or dips/surges in voltage during severe weather events, including lightning strikes, the fan associated with this system could lose power or become damaged. The vulnerability assessment should include evaluation of electrical lines entering the building to ensure they are secure to the utility pole and site building.

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), including:

- Land and/or ecosystems
  - No land or ecosystems will be disturbed during routine Site management activities.
- Water Usage

- No water will be used as all engineering controls are passive.

- Waste Generation
  - Remaining contamination is covered by asphalt/concrete which does not require operation or scheduled maintenance and, therefore, no waste will be generated. Groundwater generated during groundwater sampling will be treated on-site to minimize the need to transport and dispose of water off-site.

- Energy usage
  - Unlike a soil vapor extraction system, the SSDS is designed to run with minimal energy usage while preventing contaminants from migrating into structures.

- Emissions
  - Trips to the Site for inspections will be combined with other activities, when possible, to limit the emissions produced.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken any time that the NYSDEC 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 Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to 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.

6.2.3 Metrics and Reporting

As discussed in Section 7.0, 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.

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. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data 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 7.1.

Table 7.1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Periodic Review Report	Annually

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

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., groundwater);

- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- 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 Periodic Review Report will be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. The report will include:

- Results of the required annual site inspections, fire 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.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- 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 tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
  - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
  - A current plume map for sites with remaining groundwater contamination; and
  - A groundwater elevation contour map for each gauging event.
- 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 ROD;
  - 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;
  - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the ROD; and
  - The overall performance and effectiveness of the remedy.

  A performance summary for the SSDS will not be included since the system is monitored by the property owner.

- A quantitative and qualitative overview of a site's environmental impacts will be provided through the completion of the Summary of Green Remediation Metrics.

- A summary of the Green Remediation evaluation.

7.3 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice and registered 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 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 controls required by the remedial program was performed under my direction;*
- *The institutional 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;*
- *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*
- *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 am certifying as the Remedial Party for the site."

Certification of the SSD system, the only Engineering Control on the site, will be completed by the property owner.

7.4 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 or failure to conduct site management activities, a Corrective Measures Work Plan will be

submitted to the NYSDEC project manager 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 project manager.

8.0 REFERENCES

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

Empire Geo-services, 2017. Summary Report – 2015 Injection of 3DMe Biological Amendment Material and 2016 Groundwater Sampling Event. Former Speedy's Cleaner, Site #828128. Prepared for NYSDEC. February 16, 2017.

Empire Geo-Services, 2004. Letter to Mr. Todd Caffoe, NYSDEC Region 8, Re: Former Speedy's Dry Cleaner site. August 12, 2004.

LaBella Associates, P.C. (LaBella), 1999. Phase I Environmental Site Assessment, 2150 Monroe Avenue, Town of Brighton, Monroe County, New York. October 1999.

MACTEC, 2022a. Draft Groundwater Monitoring Report –April – June 2021 - Former Speedy's Cleaners - Site #8-28-128", prepared by MACTEC Engineering and Geology, P.C. January 2022.

MACTEC, 2022b. Draft Groundwater Monitoring Report –July – September 2021 - Former Speedy's Cleaners - Site #8-28-128, prepared by MACTEC Engineering and Consulting, P.C., January 2022.

MACTEC 2020a Engineering and Geology, P.C., Quality Assurance Program Plan and Program Field Activities Plan. Prepared for the New York State Department of Environmental Conservation, Albany, New York. April 2020.

MACTEC, 2020b. *Program Health and Safety Plan*. Prepared for New York State Department of Environmental Conservation, Albany, New York. March 2020.

MACTEC Engineering and Consulting, PC (MACTEC), 2010. Remedial Investigation/Feasibility Study Former Speedy's Cleaners - Site #8-28-128, prepared by MACTEC Engineering and Consulting, P.C. March 2010.

New York State Department of Environmental Conservation (NYSDEC), 2013. Update on Cleanup Activities; Letter to John Casciani from Jason Pelton. Former Speedy's Cleaners Site. NYSDEC Site# 828128. May 2, 2013.

NYSDEC, 2011. Joseph White Soil Excavation Summary; Memo to J. White from Jason Pelton. Former Speedy's Cleaners Site. NYSDEC Site# 828128. March 28, 2011.

NYSDEC, 2010a. Record of Decision. Former Speedy's Cleaners Site. NYSDEC Site# 828128. March 2010.

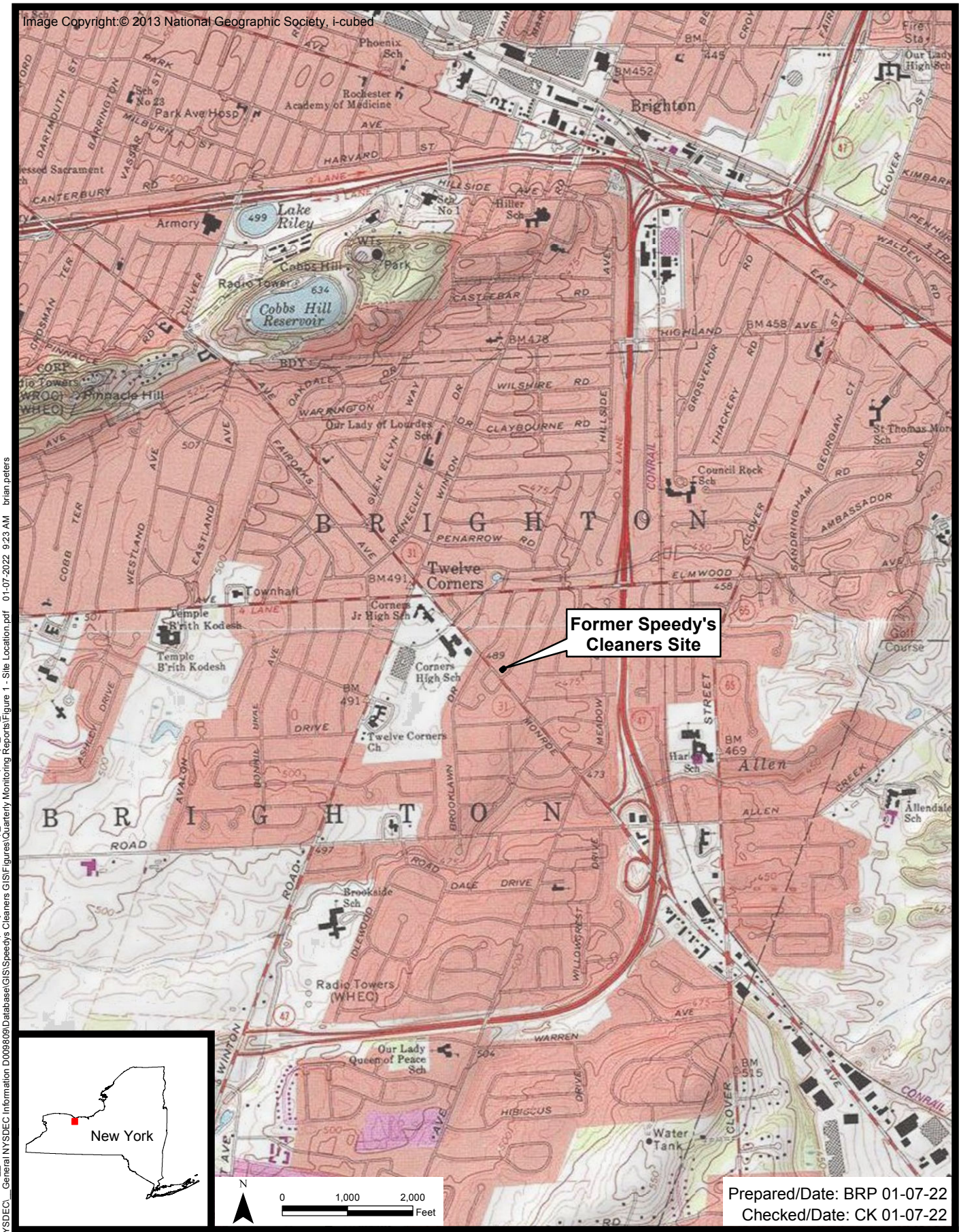
NYSDEC, 2010b. DER-10, Technical Guidance for Site Investigation and Remediation. May 3, 2010.

NYSDEC, 2004. Sub-Slab and Indoor Air Sampling Report, prepared by NYSDEC Division of Environmental Remediation, March 2004.

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).

O'Brien & Gere Engineers, Inc. 2007. Remedial Investigation Report – Carriage Cleaners – Site No. 8-28-120. Town of Brighton, NY. January 31, 2007. "Remedial Investigation."

FIGURE 1.1 SITE LOCATION MAP



Former Speedy's Cleaners
(hw828128); D009809-16
Brighton, New York

MACTEC

Site Location

Project 3616206120 Figure 1.1

Document: P:\Projects\NYSDEC_General\NYSDEC Information D009809\Database\GIS\Speedys Cleaners GIS\Map_Documents\Speedys_Site_Location.mxd
PDF: P:\Projects\NYSDEC_General\NYSDEC Information D009809\Database\GIS\Speedys Cleaners GIS\Figures\Quarterly Monitoring Reports\Figure 1 - Site Location.pdf 01-07-2022 9:23 AM brian.peters

FIGURE 1.2 SITE FEATURES MAP

Image Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

CONTINENTAL DRIVE
TORRINGTON DRIVE
HAMPSHIRE DRIVE
IRVING DRIVE
ELMORE DRIVE
MONROE AVENUE
BROOKLAWN DRIVE
ORCHARD DRIVE

MW-208S
MW-207S
HA-117
MW-209S
HA-123
HA-107
HA-116
HA-109
HA-118
HA-105
HA-106
HA-122
HA-113
HA-115
HA-110
HA-101
HA-120
MW-203S
HA-102
Newcomb Oil/Former Citgo Station
DEC Well
MW-5
MW-3
MW-111I
HA-111
OW-1
MW-8B
EW-1
MW-1
MW-301
MW-302
MW-6
MW-6B
MW-9B
MW-9
HA-104
MW-104I
MW-4
MW-7B
MW-2
HA-108
HA-121
HA-114
HA-119
MW-204S
MW-211
MW-211A
MW-201
MW-202
MW-202I
MW-213
MW-212
MW-212A
MW-210
MW-206S
MW-206
Carriage Cleaners
Former Speedy's Cleaners
MW-205S
HA-112

Legend

- SMP Monitoring Well Network
- Other Groundwater Monitoring Wells
- Former Speedy's Cleaners Building
- Carriage Cleaners Building

N

0 75 150 Feet

Carriage Cleaners (hw828120); D009809-15
3616206118
Former Speedy's Cleaners (hw828128); D009809-16
3616206120
Brighton, New York

Prepared/Date: BRP 03-11-21
Checked/Date: CRS 03-11-21

MACTEC

Site Features

Fig u re 1.2

FIGURE 2.1 GROUNDWATER CONTOUR MAP

Document: P:\Projects\NYSDEC__General NYSDEC Information D009809\Database\GIS\Speedys Cleaners GIS\Map_Documents\GW_Aug_Oct_2021_11x17LS.mxd PDF: P:\Projects\NYSDEC__General NYSDEC Information D009809\Database\GIS\Speedys Cleaners GIS\Figures\Quarterly Monitoring Reports\Q4 2021\Figure 2 - GW Contours Oct 2021.pdf 01-19-2022 7:46 AM brian.peters

Image Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

478
477
476
475
474
473
472
471
470

MW-203S
472.96

MW-204S
471.23

MW-202
477.39

MW 212
478.44

MW-206
479.51

MW-205S
475.05

Legend

- Monitoring Well
- Groundwater Contour October 2021
- (dashed where inferred)
- Groundwater Flow Direction
- Former Speedy's Cleaners Building
- Carriage Cleaners Building

N

0 75 150 Feet

Prepared/Date: BRP 01-19-22
Checked/Date: CK 01-19-22

Former Speedy's Cleaners (hw828128); D009809-16

Brighton, New York

MACTEC

Groundwater Contours October 2021

Project 3616206120

Figure 2.1

FIGURE 3 GROUNDWATER RESULTS MAP

Image Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

MW-203S	
PCE	0.6J
TCE	1U
DCE	19
VC	75

MW-204S	
PCE	17
TCE	1.4
DCE	9.9
VC	16

MW-202	
PCE	11
TCE	9.5J
DCE	890
VC	400

MW-212	
PCE	2500
TCE	830
DCE	3500
VC	420

MW-206	
PCE	1U
TCE	1U
DCE	1U
VC	1U

MW-205S	
PCE	0.96J+
TCE	0.81J+
DCE	2.8
VC	1U

Legend

- Monitoring Well
- Former Speedy's Cleaners Building
- Carriage Cleaners Building

N

0 75 150 Feet

Notes:
All results in ug/L
Samples collected 10/25/2021 except for MW-203S and MW-205S collected 10/26/2021
Qualifiers
U = not detected
J = result is estimated
J+ = estimated biased high during data validation

Prepared/Date: BRP 01-19-22
Checked/Date: CK 01-19-22

Former Speedy's Cleaners (hw828128); D009809-16

Brighton, New York

MACTEC

Groundwater Analytical Concentrations
October 2021
Project 3616206120 Figure 3

APPENDIX A – ENIRONMENTAL EASEMENT

OFFICE OF GENERAL COUNSEL

New York State Department of Environmental Conservation
625 Broadway, 14th Floor, Albany, New York 12233-1500
Phone: (518) 402-9185 • Fax: (518) 402-9018
www.dec.ny.gov

April 27, 2015

SENT VIA CERTIFIED MAIL –
RETURN RECEIPT REQUESTED

Mr. Karl S. Essler, Esq.
Bond Schoeneck & King
350 Linden Oaks, Suite 310
Rochester, NY 14625-2825

RE: Environmental Easement Package
Former Speedy's Cleaners
Site No. 828128

Dear Mr. Essler:

Enclosed, please find the fully executed Environmental Easement and TP 584 form for the above referenced Site.

Once the Environmental Easement is recorded, the local municipality will need to be notified as well as the Notice to any parties identified as having an interest in the property, as set forth in Schedule "B" of the Title Commitment.

Please return a copy of the recorded easement marked by the County Clerk's Office with the date and location of recording, and a certified copy of the municipal notice. The information from the recorded easement and recorded notices are necessary to process the Certificate of Completion.

If you have any further questions or concerns relating to this matter, please contact our office at 518-402-9510.

Sincerely,

Andrew Guglielmi

Andrew Guglielmi
Associate Attorney
Bureau of Remediation

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 22nd day of April, 2015 between Owner(s) John A. Casciani, having an office at 893 DeWitt Road, Webster, 14580, County of Monroe, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 2150 Monroe Avenue in the Town of Brighton, County of Monroe and State of New York, known and designated on the tax map of the County Clerk of Monroe as tax map parcel numbers: Section 137 Block 14 Lot 2-9, being the same as that property conveyed to Grantor by deed dated October 18, 1999 and recorded in the Monroe County Clerk's Office in Liber and Page 09228/554. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.166 +/- acres, and is hereinafter more fully described in the Land Title Survey dated June 10, 2014 prepared by Warren R. McGrail 42513, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herin, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Monroe 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;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) 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 this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5 the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her 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

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a

defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: 828128
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed

by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

John A. Casciani:

By: _____

Print Name: John A Casciani

Title: Owner Date: 4/7/15

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Monroe)

On the 7th day of April, in the year 20 15, before me, the undersigned, personally appeared John Casciani, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

KARL S. ESSLER
NOTARY PUBLIC, State of New York
Monroe County
Commission Expires May 31, 2015

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 22nd day of April, in the year 2015, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

Description of environmental easement over property located at 2150 Monroe Avenue, Lot 67 of the Malvern Tract, Town of Brighton, County of Monroe, State of New York and described as follows:

Beginning at a point on the northeast right of way of Monroe Avenue, said point being the intersection with the northwest right of way of Hampshire Drive, thence;

1. Northwesterly and along the northeast right of way of Monroe Avenue a distance of 50.00 feet to a point, thence;

2. Northeasterly and forming an interior angle of 90 degrees a distance of 150.00 feet to a point, thence;

3. Southeasterly and forming an interior angle of 90 degrees a distance of 38.32 feet to a point on the northwest right of way of Hampshire Drive, thence;

4. Southwesterly and along said northwest right of way and along a curve to the right, said curve having a radius of 200.00 feet a distance of 68.70 feet to a point of tangency, thence;

5. Continuing southwesterly and along said northwest right of way a distance of 82.65 feet to a point on the northeast right of way of Monroe Avenue, said point being the point and place of beginning. Course 5 having an interior angle with Course 1 of 90 degrees.

Containing 0.166 acres

Subject to any and all easements, restrictions and covenents that an updated Abstract of Title may show.

TP-584 (4/13)

New York State Department of Taxation and Finance

Combined Real Estate Transfer Tax Return, Credit Line Mortgage Certificate, and Certification of Exemption from the Payment of Estimated Personal Income Tax

Recording office time stamp

See Form TP-584-I, Instructions for Form TP-584, *before completing this form. Print or type.*

Schedule A — Information relating to conveyance

Grantor/Transferor	Name *(if individual, last, first, middle initial)* (☐ *check if more than one grantor)*			Social security number
☒ Individual	Casciani, John A.			103541494
☐ Corporation	Mailing address			Social security number
☐ Partnership	893 DeWitt Road			
☐ Estate/Trust	City	State	ZIP code	Federal EIN
☐ Single member LLC	Webster	NY	14580	
☐ Other	Single member's name if grantor is a single member LLC *(see instructions)*			Single member EIN or SSN

Grantee/Transferee	Name *(if individual, last, first, middle initial)* (☐ *check if more than one grantee)*			Social security number
☐ Individual	Commissioner of the Department of Environmental Conservation			
☐ Corporation	Mailing address			Social security number
☐ Partnership	625 Broadway			
☐ Estate/Trust	City	State	ZIP code	Federal EIN
☐ Single member LLC	Albany	NY	12233	14-6013200
☒ Other	Single member's name if grantee is a single member LLC *(see instructions)*			Single member EIN or SSN

Location and description of property conveyed

Tax map designation – Section, block & lot *(include dots and dashes)*	SWIS code (six digits)	Street address	City, town, or village	County
137.14-2-9	262000	2150 Monroe Avenue	Brighton	Monroe

Type of property conveyed *(check applicable box)*

1 ☐ One- to three-family house
2 ☐ Residential cooperative
3 ☐ Residential condominium
4 ☐ Vacant land
5 ☒ Commercial/Industrial
6 ☐ Apartment building
7 ☐ Office building
8 ☐ Other _____

Date of conveyance: 04 / 22 / 2015 (month / day / year)

Percentage of real property conveyed which is residential real property 0 % *(see instructions)*

Condition of conveyance *(check all that apply)*

a. ☐ Conveyance of fee interest
b. ☐ Acquisition of a controlling interest (state percentage acquired _____ %)
c. ☐ Transfer of a controlling interest (state percentage transferred _____ %)
d. ☐ Conveyance to cooperative housing corporation
e. ☐ Conveyance pursuant to or in lieu of foreclosure or enforcement of security interest *(attach Form TP-584.1, Schedule E)*
f. ☐ Conveyance which consists of a mere change of identity or form of ownership or organization *(attach Form TP-584.1, Schedule F)*
g. ☐ Conveyance for which credit for tax previously paid will be claimed *(attach Form TP-584.1, Schedule G)*
h. ☐ Conveyance of cooperative apartment(s)
i. ☐ Syndication
j. ☐ Conveyance of air rights or development rights
k. ☐ Contract assignment
l. ☐ Option assignment or surrender
m. ☐ Leasehold assignment or surrender
n. ☐ Leasehold grant
o. ☒ Conveyance of an easement
p. ☐ Conveyance for which exemption from transfer tax claimed *(complete Schedule B, Part III)*
q. ☐ Conveyance of property partly within and partly outside the state
r. ☐ Conveyance pursuant to divorce or separation
s. ☐ Other *(describe)* _____

For recording officer's use	Amount received	Date received	Transaction number
	Schedule B., Part I $ _____		
	Schedule B., Part II $		

Schedule B — Real estate transfer tax return (Tax Law, Article 31)

Part I – Computation of tax due

1	Enter amount of consideration for the conveyance *(if you are claiming a total exemption from tax, check the exemption claimed box, enter consideration and proceed to Part III)* ☐ **Exemption claimed**	1.	0 00
2	Continuing lien deduction *(see instructions if property is taken subject to mortgage or lien)*	2.	0 00
3	Taxable consideration *(subtract line 2 from line 1)*	3.	0 00
4	Tax: $2 for each $500, or fractional part thereof, of consideration on line 3	4.	0 00
5	Amount of credit claimed for tax previously paid *(see instructions and attach Form TP-584.1,* Schedule G*)*	5.	0 00
6	Total tax due* *(subtract line 5 from line 4)*	6.	0 00

Part II – Computation of additional tax due on the conveyance of residential real property for $1 million or more

1	Enter amount of consideration for conveyance *(from* Part I*, line 1)*	1.	
2	Taxable consideration *(multiply line 1 by the percentage of the premises which is residential real property, as shown in* Schedule A*)*	2.	
3	Total additional transfer tax due* *(multiply line 2 by 1% (.01))*	3.	

Part III – Explanation of exemption claimed on Part I, line 1 *(check any boxes that apply)*

The conveyance of real property is exempt from the real estate transfer tax for the following reason:

a. Conveyance is to the United Nations, the United States of America, the state of New York, or any of their instrumentalities, agencies, or political subdivisions (or any public corporation, including a public corporation created pursuant to agreement or compact with another state or Canada) ..... a ☐

b. Conveyance is to secure a debt or other obligation ..... b ☐

c. Conveyance is without additional consideration to confirm, correct, modify, or supplement a prior conveyance ..... c ☐

d. Conveyance of real property is without consideration and not in connection with a sale, including conveyances conveying realty as bona fide gifts ..... d ☐

e. Conveyance is given in connection with a tax sale ..... e ☐

f. Conveyance is a mere change of identity or form of ownership or organization where there is no change in beneficial ownership. (This exemption cannot be claimed for a conveyance to a cooperative housing corporation of real property comprising the cooperative dwelling or dwellings.) Attach Form TP-584.1, Schedule F ..... f ☐

g. Conveyance consists of deed of partition ..... g ☐

h. Conveyance is given pursuant to the federal Bankruptcy Act ..... h ☐

i. Conveyance consists of the execution of a contract to sell real property, without the use or occupancy of such property, or the granting of an option to purchase real property, without the use or occupancy of such property ..... i ☐

j. Conveyance of an option or contract to purchase real property with the use or occupancy of such property where the consideration is less than $200,000 and such property was used solely by the grantor as the grantor's personal residence and consists of a one-, two-, or three-family house, an individual residential condominium unit, or the sale of stock in a cooperative housing corporation in connection with the grant or transfer of a proprietary leasehold covering an individual residential cooperative apartment ..... j ☐

k. Conveyance is not a conveyance within the meaning of Tax Law, Article 31, section 1401(e) *(attach documents supporting such claim)* ..... k ☐

*The total tax (from Part I, line 6 and Part II, line 3 above) is due within 15 days from the date conveyance. Please make check(s) payable to the county clerk where the recording is to take place. If the recording is to take place in the New York City boroughs of Manhattan, Bronx, Brooklyn, or Queens, make check(s) payable to the ***NYC Department of Finance***. If a recording is not required, send this return and your check(s) made payable to the ***NYS Department of Taxation and Finance***, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-5045.

Schedule C — Credit Line Mortgage Certificate (Tax Law, Article 11)

Complete the following only if the interest being transferred is a fee simple interest.
I (we) certify that: *(check the appropriate box)*

1. ☒ The real property being sold or transferred is not subject to an outstanding credit line mortgage.

2. ☐ The real property being sold or transferred is subject to an outstanding credit line mortgage. However, an exemption from the tax is claimed for the following reason:
   - ☐ The transfer of real property is a transfer of a fee simple interest to a person or persons who held a fee simple interest in the real property (whether as a joint tenant, a tenant in common or otherwise) immediately before the transfer.
   - ☐ The transfer of real property is (A) to a person or persons related by blood, marriage or adoption to the original obligor or to one or more of the original obligors or (B) to a person or entity where 50% or more of the beneficial interest in such real property after the transfer is held by the transferor or such related person or persons (as in the case of a transfer to a trustee for the benefit of a minor or the transfer to a trust for the benefit of the transferor).
   - ☐ The transfer of real property is a transfer to a trustee in bankruptcy, a receiver, assignee, or other officer of a court.
   - ☐ The maximum principal amount secured by the credit line mortgage is $3,000,000 or more, and the real property being sold or transferred is **not** principally improved nor will it be improved by a one- to six-family owner-occupied residence or dwelling.

     Please note: for purposes of determining whether the maximum principal amount secured is $3,000,000 or more as described above, the amounts secured by two or more credit line mortgages may be aggregated under certain circumstances. See TSB-M-96(6)-R for more information regarding these aggregation requirements.
   - ☐ Other *(attach detailed explanation)*.

3. ☐ The real property being transferred is presently subject to an outstanding credit line mortgage. However, no tax is due for the following reason:
   - ☐ A certificate of discharge of the credit line mortgage is being offered at the time of recording the deed.
   - ☐ A check has been drawn payable for transmission to the credit line mortgagee or his agent for the balance due, and a satisfaction of such mortgage will be recorded as soon as it is available.

4. ☐ The real property being transferred is subject to an outstanding credit line mortgage recorded in _____ (insert liber and page or reel or other identification of the mortgage). The maximum principal amount of debt or obligation secured by the mortgage is _____. No exemption from tax is claimed and the tax of _____ is being paid herewith. *(Make check payable to county clerk where deed will be recorded or, if the recording is to take place in New York City but not in Richmond County, make check payable to the **NYC Department of Finance.**)*

Signature (both the grantor(s) and grantee(s) must sign)

The undersigned certify that the above information contained in schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of his/her knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

Grantor signature	Title	Grantee signature	Title
[signature]	OWNER	By: Andrew Guglielmi	Commissioner of the Dept. of Environmental Conservation
John A. Casciani			
Grantor signature	Title	Andrew Guglielmi Grantee signature	Attorney Title

Reminder: Did you complete all of the required information in Schedules A, B, and C? Are you required to complete Schedule D? If you checked *e*, *f*, or *g* in Schedule A, did you complete Form TP-584.1? Have you attached your check(s) made payable to the county clerk where recording will take place or, if the recording is in the New York City boroughs of Manhattan, Bronx, Brooklyn, or Queens, to the ***NYC Department of Finance***? If no recording is required, send your check(s), made payable to the ***Department of Taxation and Finance***, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-5045.

Schedule D - Certification of exemption from the payment of estimated personal income tax (Tax Law, Article 22, section 663)

Complete the following only if a fee simple interest or a cooperative unit is being transferred by an individual or estate or trust.

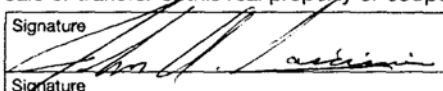
If the property is being conveyed by a referee pursuant to a foreclosure proceeding, proceed to Part II, and check the second box under *Exemptions for nonresident transferor(s)/seller(s)* and sign at bottom.

Part I - New York State residents

If you are a New York State resident transferor(s)/seller(s) listed in Schedule A of Form TP-584 (or an attachment to Form TP-584), you must sign the certification below. If one or more transferors/sellers of the real property or cooperative unit is a resident of New York State, **each** resident transferor/seller must sign in the space provided. If more space is needed, please photocopy this Schedule D and submit as many schedules as necessary to accommodate all resident transferors/sellers.

Certification of resident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law, section 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
	John A. Casciani	
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Note: A resident of New York State may still be required to pay estimated tax under Tax Law, section 685(c), but not as a condition of recording a deed.

Part II - Nonresidents of New York State

If you are a nonresident of New York State listed as a transferor/seller in Schedule A of Form TP-584 (or an attachment to Form TP-584) but are not required to pay estimated personal income tax because one of the exemptions below applies under Tax Law, section 663(c), check the box of the appropriate exemption below. If any one of the exemptions below applies to the transferor(s)/seller(s), that transferor(s)/seller(s) is not required to pay estimated personal income tax to New York State under Tax Law, section 663. **Each** nonresident transferor/seller who qualifies under one of the exemptions below must sign in the space provided. If more space is needed, please photocopy this Schedule D and submit as many schedules as necessary to accommodate all nonresident transferors/sellers.

If none of these exemption statements apply, you must complete Form IT-2663, *Nonresident Real Property Estimated Income Tax Payment Form*, or Form IT-2664, *Nonresident Cooperative Unit Estimated Income Tax Payment Form*. For more information, see *Payment of estimated personal income tax*, on page 1 of Form TP-584-I.

Exemption for nonresident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law, section 663 due to one of the following exemptions:

☐ The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ (Date) to _____ (Date) *(see instructions)*.

☐ The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.

☐ The transferor or transferee is an agency or authority of the United States of America, an agency or authority of the state of New York, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

APPENDIX B – MONITORING WELL BORING AND CONSTRUCTION LOGS

APPENDIX B – MONITORING WELL BORING AND CONSTRUCTION LOGS

Monitoring well boring and construction logs included are for MW-206, MW-202I, MW-203S, MW-204S, MW-205S, MW-206, and MW-210.

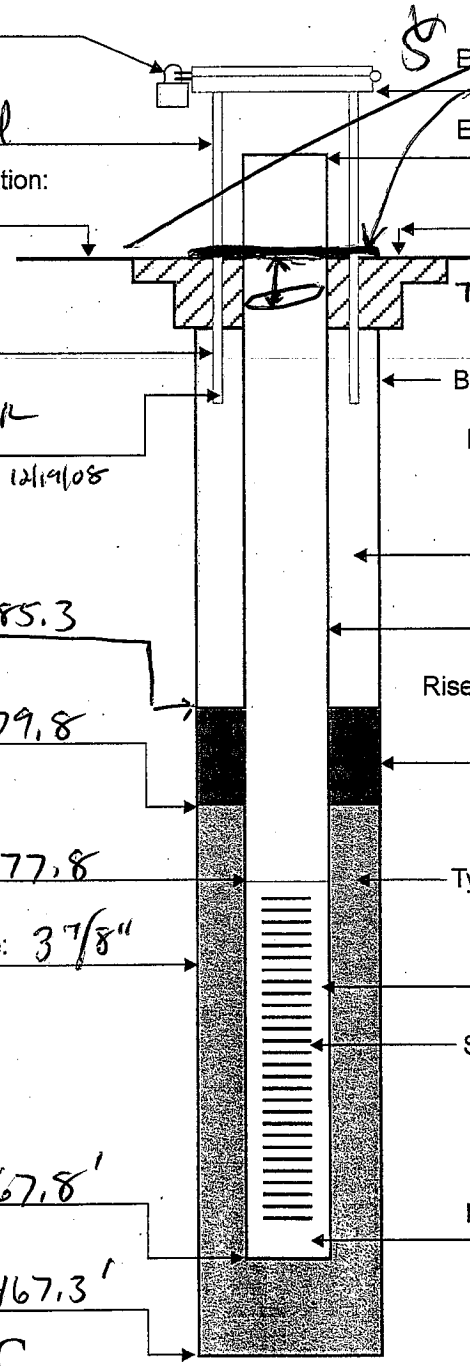
Monitoring well boring and construction logs for HA-112, HA-119, MW-211, MW-212, MW-211A, MW-212A, and MW-213 are not included and could not be located in historical reports.

Bedrock Well Construction Diagram

Well No.: MW-206

Project No.: 36120821.09	Project Name: Former Speedys Cleaners
	Project Area: Rochester, NY
Contractor: Geologic NY	Driller: Scott Breeds — Method: HSA (3 7/8"); Drive Casing (4"); HQ core
Logged By: Brandon Shaw	Date Started: 12-17-08 — Completed: 12-18-08
Checked By: JKP — Date: 01/07/09	Well Development Date: 12-19-2008

Not To Scale



Lock Identification: S

Surface Casing Type: Flushmount steel

Ground Surface Elevation: 486.83

Surface Casing Diameter: UNK

Inside Diameter of Surface Casing: UNK

GW = 7.13' TOR 12/19/08

Depth/Elevation of Top of Well Seal: 1.5' BGS / 485.3

Depth/Elevation of Top of Sand: 7' BGS / 479.8

Depth/Elevation of Top of Screen: 9.0 BGS / 477.8

Diameter of Corehole: 3 7/8" HQ

Depth/Elevation of Bottom of Screen: 19.0 BGS / 467.8'

Depth/Elevation of Bottom of Corehole: 19.5' BGS / 467.3'

Elevation of top of Surface Casing: 486.83

Elevation of top of Riser Pipe: 486.49

Type of Surface Seal: Blacktop Patch / Concrete

TOC - TOR: 0.35'

Borehole Diameter: ~~4" to 3 7/8"~~ 6"

Inside Diameter of Borehole Casing: N/A (4")

Type of Backfill: Soil cuttings

Type of Riser: Sch 40 PVC

Riser Inside Diameter: 2"

Type of Seal: Bentonite Chips

Bedrock Elevation/Depth: / 10-8'

Type of Sand Pack: #0 Industrial Quartz

Type of Screen: Sch 40 PVC

Slot Size x Length: 0.010" x 10'

Inside Diameter of Screen: 2"

Depth of Sediment Sump with Plug: 19.5' BGS (0.48')

MACTEC

511 Congress Street
Portland, ME 04101

DR 5/11/09

FIGURE 4-8
BEDROCK MONITORING WELL CONSTRUCTION DIAGRAM
NYSDEC QUALITY ASSURANCE PROJECT PLAN

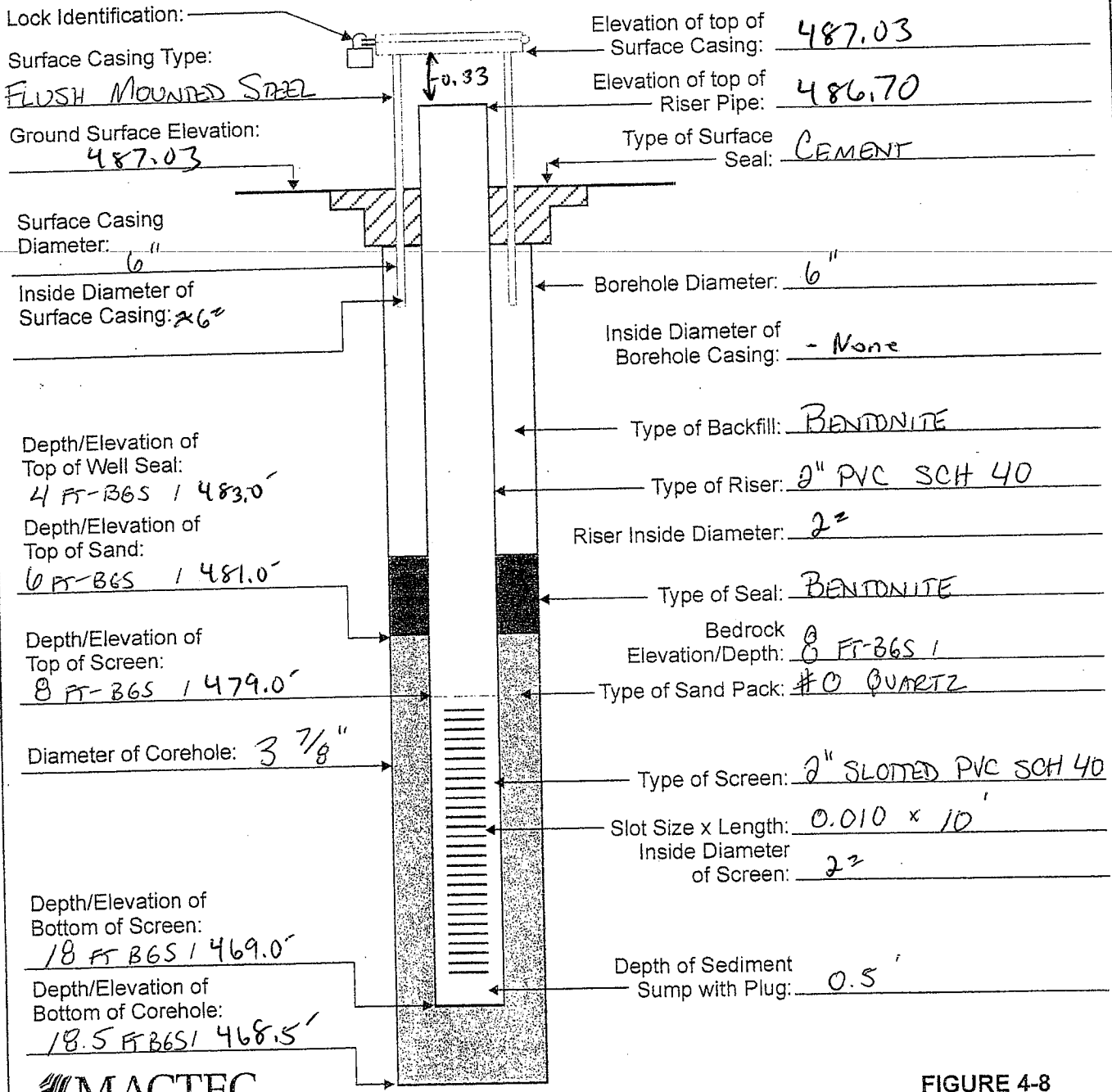
PORT2007022g.cdr

Bedrock Well Construction Diagram

Well No.: MW-210

Project No.: 36120821O9.02.01	Project Name: FORMER SPEEDY'S CLEANERS		
NYSDEC	Project Area: Rochester, N.Y.		
Contractor: GEOLOGIC	Driller: DAVE	Method: 3.5" ROLLERBIT	
Logged By: W. Swinehart		Date Started: 12-23-08	Completed: 12-23-08
Checked By: C. Stoples	Date: 12/9/09	Well Development Date: 12-23-08	

Not To Scale



MACTEC
511 Congress Street
Portland, ME 04101

FIGURE 4-8
BEDROCK MONITORING WELL CONSTRUCTION DIAGRAM
NYSDEC QUALITY ASSURANCE PROJECT PLAN

PORT2007022g.cdr

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-202I
Client: Carriage Cleaners	Sampler: Split spoon	Page 1 of 1
Proj. Loc: Town of Brighton, Rochester, NY	Hammer: 140 lb	Location:
File No.: 10653\35749	Fall: 30"	Start Date: 5/20/2005 End Date: 5/20/2005
Boring Company: Nothnagle Inc Foreman: Neil Short OBG Geologist: Yuri Veliz		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip Installed	Field Testing PID (ppm)	USCS
0	1	2	2/3	21/5	6	Moderate brown (5YR 4/4), firm, damp, silt, some fine sand and clay	Silt		5.1	
			3/3							
2	2	4	2/4	2/1.5	9	Same as above, wet, stiff			1.8	
			5/6							
							4'			
4	3	6	3/3	2/1.0	8	Moderate brown (5YR 4/4), damp, firm, fine sand and silt, some fine gravel	Fine Sand		5.2	
			5/6				Silt			
							6'			
6	4	8	6/16	2/0.8	11	Moderate brown (5YR 4/4), dense, damp, fine to medium sand and silt, some fine to medium gravel. Weathered rock interlayered	Sand and Silt Gravel		26.0	
			39/100/.2							
							8'			
8	5	9.7	50/.2	2/0.5		Poor recovery.	Weathered Rock and Gravel		158.0	
						Dark yellowish brown (10YR 4/2), damp, dense, weathered rock and gravel. Some silt and sand				
						Auger refusal at 9.7' bg				
						End of Boring - 9.7' bg	9.7' bg			
							EOB Bedrock			
						See core log for rock description				

O'BRIEN & GERE ENGINEERS, INC.
5000 Brittonfield Parkway
East Syracuse, New York 13057 File: Corelog.xls

CORE LOG

Hole No.: MW-202I | Job No.: 10653/35749
Sheet 1 of 2 | Date Started: 5/24/2005

Project: Carriage Cleaners RI/FS Study | Drilling Contractor: Nothnagle | Date Finished 5/24/2005
Client: NYSDEC | Driller: Neil Short | Total Depth: 50.5 ft
Purpose: Bedrock Well installation | Geologist: Yuri Veliz | Ground Elev.:
Location: Town of Brighton, Rochester, NY | Length of Casing: | S.W.L.:
Hole Location: | Casing Size: 4" | Core Size: 3" | Inclination/Bearing:

Formation / Member / Unit	Run No. / Depth	Pen. Rate (min. per foot)	Depth Scale	Lithologic Description (include in order: ROCK TYPE, color, grain size, texture, bedding, fracture & minerals.)	Core Recovery Length	Core Recovery Percent	RQD
		8	12.2	Dolostone, dark gray, fine grained, hard. Very fractured, hoizontal and vertical fractures from			
	1	8		12' to 15.5' bg	2.2	63%	0
		8	15.5	thin shaly layers, calcite cements and vugs.			
		4		Dolostone, medium dark gray, aphanitic to fine grained, hard. Horizontal fractures at 15.5', 15.9',			
		4		16.1', 16.2', 16.4', 16.5', 16.6', 16.8' to 17.1', 17.3' to 17.9', 18.9', 19', 19.2', 19.5', 20.1' to 20.5' bg.			
	2	4		At 17.3' to 17.9' bg zone of vugs, pits and calcite cement. From 17.9' rock is dark gray	5	100%	47%
		4		less fractures, no vertical fractures.			
		4	20.5				
		3.8		Dolostone, medium gray, fine grained, hard. Horizontal fractures from 20.5' to 21.4' (very fractured)			
		3.8		21.6', 21.9', 23', 23.3', 23.45', 24.5', 24.8', 25.2', 25.5' bg.	5	100%	67%
	3	3.8		rock more competent beyond 21.9 bg.			
		3.8					
		3.8	25.5				
		3.4		Dolostone, medium gray, fine grained, hard. Horizontal fractures at 25.5', 25.8', 25.9', 26.2', 28',			
		3.4		28.4', 28.6', 29.8', 30', and 30.2' bg. Zones of vugs, pits and calcite cement. No vertical fractures.	5	100%	77%
	4	3.4		packer installed from 20' to 30.5' bg.			
		3.4		water lost app. 200 gall.			
		3.4	30.5				
		4.8		Dolostone, medium gray, aphanitic to fine grained, hard. Horizontal fractures at 30.5', 30.85', 30.95',			
		4.8		31.1', 33.4', 34.7', 35.5' bg. Fewer fractures, no vertical fractures, more competent rock. Some	5	100%	78%
	5	4.8		vugs and calcite cement along with shaly layers.			
		4.8					
		4.8	35.5				
		3		Dolostone, medium dark gray, fine grained, hard, horizontal fractures at 36.2', 36.7', 36.8', 37.2',			
		3		39.9' bg. No vertical fractures, more competent rock, zone of vugs from 35.5' to 40.3' bg. Some	4.9	99%	78%
	6	3		dark gray shaly layers.			
		3		packer interval installed from 30.5' to 40.5' bg			
		3	40.5	water lost app. 150 gall.			

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-206S
Client: Carriage Cleaners	Sampler: Split spoon	Page 1 of 1
Proj. Loc: Town of Brighton, Rochester, NY	Hammer: 140 lb	Location:
File No.: 10653\35749	Fall: 30"	Start Date: 5/26/2005 End Date: 5/26/2005
Boring Company: Nothnagle Inc Foreman: Neil Short OBG Geologist: Yuri Veliz		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip Installed	Field Testing PID (ppm)	USCS
0	1	2	2/3	2/0.1	5	No Recovery	Silt Fine Sand			N/A
			2/2							
2	2	4	2/3	2/1.0	12	Light brown (5YR 5/6), damp, medium dense, silt, some clay and fine sand, fine gravel			3.6	
			4/2							
							4'			
4	4	6	1/2	2/0.8	6	Dusky brown (5YR 2/2) damp, medium dense, coarse sand and gravel, some silt	Coarse Sand Gravel		18.2	
			4/2							
							6'			
6	5	8	4/4	2/1.5	15	Moderate brown (5YR 4/4), wet, dense, fine to medium sand and silt. Some coarse gravel, trace cobbles	Fine to Medium Sand		15.2	
			7/14				▽ 7.4'			
8	6	10	3/17	1.5/1	28	Dark yellowish brown (10YR 4/2), damp to wet dense, fine to medium sand and coarse gravel, some cobble, silt			92	
			21/25							
							10'			
10	7	11.2	12/14	1.2/1	114	Moderate brown (5YR 3/4), saturated, dense, gravel and coarse gravel (weathered rock), some silt and sand. Refusal at 11.2' bg	Gravel Coarse Sand		98	
			100/.2							
						Auger to 12' bg				
						Well installed at 12' bg				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-205S
Client: Carriage Cleaners	Sampler: Split spoon	Page 1 of 1
Proj. Loc: Town of Brighton, Rochester, NY	Hammer: 140 lb	Location:
File No.: 10653\35749	Fall: 30"	Start Date: 5/26/2005 End Date: 5/26/2005
Boring Company: Nothnagle Inc Foreman: Neil Short OBG Geologist: Yuri Veliz		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip Installed	Field Testing PID (ppm)	USCS
0	1	2	2/2	2/1.0	4	Moderate brown (5YR 3/4) damp, loose, silt and fine sand	Silt Fine Sand		0	N/A
			2/2							
2	2	4	1/2	2/1.0	4	Moderate brown (5YR 4/4), wet to damp, loose, silt, some clay and fine sand			0	
			2/2							
							4'			
4	3	6	1/2	2/1.0	4	Moderate brown (5YR 3/4), saturated loose, fine sand and silt, some coarse gravel, few clay	▽ 4' Fine Sand Silt		20	
			2/2							
6	4	7.25	1	1.25/0.5		Poor recovery	Fine Sand Silt		80	
			100/.25			Moderate brown (5YR 3/4), wet, loose to firm, fine sand and silt, some coarse gravel and cobble (weathered rock)				
							7.25'			
						Spoon refusal at 7.25' bg (End of boring)	EOB Bedrock			
						Auger refusal as well as 7.25' bg				
						Roller bit to 15' bg Well installed at 15'bg				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-204S
Client: Carriage Cleaners	Sampler: Split spoon	Page 1 of 1
Proj. Loc: Town of Brighton, Rochester, NY	Hammer: 140 lb	Location:
File No.: 10653\35749	Fall: 30"	Start Date: 5/31/2005 End Date: 6/1/2005
Boring Company: Nothnagle Inc Foreman: Neil Short OBG Geologist: Yuri Veliz		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip Installed	Field Testing PID (ppm)	Field Testing USCS
0	1	2	3/4	2/1.0	9	Moderate brown (5YR 3/4) damp, firm, silt and fine sand, some clay	Silt Fine Sand		0	N/A
			5/6							
							2'			
2	2	4	10/4	2/0.8	9	Moderate brown (5YR 3/4) wet, firm, fine to medium sand and silt	Fine to Medium Sand and Gravel		0	
			5/6							
4	3	5.5		1.5/~1.0		Spoon bent. Moderate brown (5YR 3/4) damp to wet, fine to medium sand, some coarse gravel, rock fragments. Little silt	Rock Fragments		3.7	
						Spoon refusal and auger refusal - 5.5' bg (End of Boring)	5.5 EOB Bedrock			
						Roller bit to 16' bg				
						Well installed at 16'bg				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-203S
Client: Carriage Cleaners	Sampler: Split spoon	Page 1 of 1
Proj. Loc: Town of Brighton, Rochester, NY	Hammer: 140 lb	Location:
File No.: 10653\35749	Fall: 30"	Start Date: 6/2/2005 End Date: 6/2/2005
Boring Company: Nothnagle Inc Foreman: Neil Short OBG Geologist: Yuri Veliz		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip Installed	Field Testing PID (ppm)	Field Testing USCS
0	1	2	3/2	2/0.8	4	Moderate brown (5YR 3/4), dry, loose, fine sand and silt. Some medium to coarse sand	Fine Sand Silt		0	N/A
			2/1							
2	2	4	1/5	2/1.0	11	Same as above. Coarse gravel, rock fragments	Gravel		0	
			6/10							
							4'			
4	3	6	8/10	2/12	13	Moderate brown (5YR 4/4), damp to wet, dense, fine to medium sand and gravel. Little silt	Fine-Med Sand		0	
			3/3							
							Gravel			
6	4	7.3	3/12	1.3/0.2		Poor recovery. Spoon refusal.			0	
			100/.3			Same as above				
						Auger refusal	7.3'			
						Roller bit to 16' bg	EOB			
						Well Installed at 16' bg	Bedrock			
						End of boring - 7.3' bg				

APPENDIX C – EXCAVATION WORK PLAN/ NYSDEC DER-10

APPENDIX C – EXCAVATION WORK PLAN (EWP)

C-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.

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 H 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.

C-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 Section D-7 of this Appendix.

C-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.

C-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.

C-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.

A materials transport plan describing the trucking routes and indicated on mapping will be provided to the NYSDEC for approval prior to the start of excavation activities. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes 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; (f) overall safety in transport; and (g) community input.

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.

C-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).

C-7 MATERIALS REUSE ON-SITE

'Reuse on-site' means reuse on-site of material that originates at the site and which does not leave the site during the excavation. Material reuse on-site will comply with the requirements of NYSDEC DER-10 Section 5.4(e)4.

Prior to the reuse of materials on-site, a reuse plan will be submitted for approval to the NYSDEC. The following topics should be covered in the materials re-use plan:

- Procedure for determining if reuse is appropriate;

- Sampling (methods and analytical);
- Stockpile segregation scheme for on-site reuse; and
- Size of stockpiles, location (figure).

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. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the 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.

C-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.

C-9 SITE RESTORATION

After the completion of soil removal and any other invasive activities, a 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. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

C-10 BACKFILL FROM OFF-SITE SOURCES

A plan for using backfill from off-site sources shall be submitted to the NYSDEC for approval prior to placement of material. This plan shall describe all methods for the import, handling and placement of backfill material from off-site. The requirements for backfill used at the site shall be consistent with the backfill requirements provided in DER-10.

The plan should contain the following:

- Source area approval process
  - Sources of backfill material
- Source area background check
- DOT Certification
  - Chemical sampling
- Analytes
- Frequency
  - Imported Soil Chemical Quality Standards
- Applicability of protection of groundwater SCOs
- Applicability of protection of ecological resources SCOs
- Stockpile procedures for imported backfill material
  - Size of stockpiles, cover, etc.

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). 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.

C-11 STORMWATER POLLUTION PREVENTION

Prior to the start of excavation, a Stormwater Pollution Prevention Plan (SPPP) that conforms to the requirements of the NYSDEC Division of Water guidelines and NYS regulations will be required. Once an SPPP has been compiled, it shall be included as part of the update to the SMP and EWP.

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.

C-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.

C-13 COMMUNITY AIR MONITORING PLAN

Prior to the start of excavation activities a Community Air Monitoring Plan (CAMP) that is in conformance with DER-10 will be required. The CAMP, at a minimum, should include:

- Details of the perimeter air monitoring program;
- Action levels to be used;
- Methods for air monitoring ;
- Analytes measured and instrumentation to be used;
- A figure of the location(s) of all air monitoring instrumentation. A figure showing specific locations must be presented for monitoring stations based on generally prevailing wind conditions, with a note that the exact locations to be monitored on a given day will be established based on the daily wind direction.

Prevailing wind locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

C-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-and on-site. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the

source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

C-15 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

C-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

ERRATA SHEET for

DER-10, *Technical Guidance for Site Investigation and Remediation*
Issued on May 3, 2010

Citation and Page Number	Current Text	Corrected Text	Date
Table 1.5, Document 9 (SMPs): 'Certified by' column 'Certification' column Page 21	 Certified by = NYSPE Certification = 1.5(b) 2	 Certified by = QEP or NYSPE Certification = 1.5(b) 1 since SMP is considered to be a work plan	 09/14/2015 09/14/2015
Section 4.1(f)(2)(i) Page 131	for residential or restricted residential use, is to be two feet;	for restricted residential use, is to be two feet;	11/07/2017
Table 1.5, Document 13 (Underground storage tank waiver) Page 21	pursuant to clause 5.5(c)3.v.(3)	pursuant to clause 5.5(d)2.	04/09/2019

DER-10 / Technical Guidance for Site Investigation and Remediation

New York State Department of Environmental Conservation

DEC Program Policy

Issuing Authority: Val Washington	**Title:** Deputy Commissioner, Office of Remediation and Materials Management
Date Issued: May 3, 2010	**Latest Date Revised:**

I. Summary: This guidance provides an overview of the site investigation and remediation process for the New York State Department of Environmental Conservation (DEC) remedial programs administered by the Division of Environmental Remediation (DER). These include the Inactive Hazardous Waste Disposal Site Remedial Program, known as the State Superfund Program (SSF); Brownfield Cleanup Program (BCP); Environmental Restoration Program (ERP); and Voluntary Cleanup Program (VCP); and certain petroleum releases.

II. Policy: DER administers the SSF, BCP, ERP, VCP and Bulk Storage Programs and provides response to releases of petroleum. This guidance assists the user in developing and implementing investigation and remediation projects involving contaminated sites under these programs administered by DER. It is a separate document of the requirements for a remedial program set forth in statute and regulation, as well as in guidance. It reflects DER's experience and knowledge in developing and managing the various programs for the past 25 years.

III. Purpose and Background: This guidance provides the scope of activities needed to satisfy minimum requirements for the life-cycle of the site-specific remedial program under the SSF, BCP, ERP, and VCP, and for certain petroleum releases. It facilitates consistent, accurate, efficient and timely completion of remedial projects. It also contains the minimum technical activities DEC will generally accept for projects where DER oversight, approval or acceptance is sought or mandated by law.

DER will, however, determine the acceptable minimum technical activities for a particular site upon consideration of all the facts and circumstances of such site under the authority of applicable laws and regulations. No provision of this guidance document should be construed to limit DER's authority to require additional investigation and/or remediation based upon site-specific conditions. Sections 1.1 and 1.2 present the scope and applicability of this guidance document in more detail.

No provisions of this guidance, however, should be construed to alter the requirements of the Navigation Law or Environmental Conservation Law, or any regulation or order or permit having the force of law. This guidance does not replace or supersede protocols established for emergency spill response actions, emergency drum removal actions, and other such events requiring immediate responses and follow-up. In such time-critical situations, existing guidance established pursuant to applicable emergency response laws, regulations and policy, and directives of the on-scene DEC Spill Responder or Project Manager must be followed.

IV. Responsibility: Remedial Bureau C in DER is responsible for interpreting and maintaining this guidance document. The procedures are to be used by DER staff and regulated entities responsible for sites in the remedial programs.

V. Procedure: This guidance assists the user in developing and implementing investigation and remediation projects under the above described programs administered by DER. This guidance is attached as a separate document and included herein by reference. A summary of topics addressed by each chapter are provided below.

Chapter 1 provides general information, establishes the basic "rules-of-the-game" for utilizing the guidance, and includes issues which are common to many elements of a remedial program.

Chapter 2 describes the minimum quality assurance guidelines and criteria for sampling and laboratory analysis activities. The guidance provided in Chapter 2 applies to various sampling and analytical activities associated with projects or project phases outlined in subsequent chapters.

Chapters 3 through 6 present technical guidance addressing each of the investigative and remedial steps that should be undertaken at contaminated sites toward fulfillment of the remedial program goals and objectives, from identifying a site to its eventual long term management and close out. This follows an iterative process, which begins in Chapter 3 with an assessment of environmental conditions at the site based on the review of existing sources of information and preliminary field investigations (Site Characterization) and progresses through the detailed and focused site investigation (Remedial Investigation).

Chapter 4 addresses remedy selection, detailing the development of remedial alternatives, their evaluation and selection of the remedy.

Chapter 5 details design and construction activities.

Chapter 6 provides the description of the required site management and periodic review process, and includes guidance on site and project close out considerations.

VI. Related References:

- Environmental Conservation Law, Article 27 Titles 3, 5, 13 and 14.
- Article 12 of the Navigation Law, Section 178.
- 6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
- 6 NYCRR Part 611, Environmental Priorities and Procedures in Petroleum Cleanup and Removal. November 5, 1984 (amended).
- Bulk Storage Programs:
  - Petroleum Bulk Storage Program (6 NYCRR Parts 612-614; February 1992)
  - Chemical Bulk Storage Program (6 NYCRR Parts 595-599; August 1994)
  - Major Oil Storage Facilities Program (6 NYCRR Part 610; 1985)

- Program Policy DER-23 *Citizen Participation Handbook for Remedial Programs*. NYS DEC. January 2010.

- Commissioner Policy CP-43 *Groundwater Monitoring Well Decommissioning*.

  NYSDEC. August 2009.

- Commissioner Policy on *Soil Cleanup Guidance*. NYS DEC.

- Analytical Services Protocol (ASP). (FTP Zip file folder with documents) NYS DEC.

- *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* . NYS Department of Health. October 2006.

- Preparation Aids for the Development of Category I Quality Assurance Project Plans. USEPA. EPA/600/8-91/003. February 1991.

- USEPA Contract Laboratory Program; Statement of Work for Organic Analysis; Multi-Media, Multi-Concentration. EPA/540/R/94/097. December 1994.

- Standards, Criteria and Guidance (SCGs) for Investigation and Remediation of Sites under Remedial Programs

This Page Intentionally Left Blank

Department of Environmental Conservation

Division of Environmental Remediation

DER-10

TECHNICAL GUIDANCE

FOR

SITE INVESTIGATION AND REMEDIATION

May 2010

New York State Department of Environmental Conservation
David A. Paterson, *Governor* Alexander B. Grannis, *Commissioner*

This Page Intentionally Left Blank

DIVISION OF ENVIRONMENTAL REMEDIATION
TECHNICAL GUIDANCE FOR
SITE INVESTIGATION AND REMEDIATION

CHAPTER 1 GENERAL INFORMATION

1.1 Scope 5
1.2 Applicability 5
1.3 Definitions 7
1.4 Notification 17
1.5 Certifications 19
1.6 Documenting Compliance with the Technical Guidance 25
1.7 Considerations for Going Beyond the Acceptable Technical Guidance 27
1.8 Areas of Concern at Sites Subject to This Technical Guidance 28
1.9 Health and Safety Plan 30
1.10 Exemptions From Obtaining NYS and Local Permits and Other Authorizations 32
1.11 Interim Remedial Measures 34
1.12 Use of a Site 36
1.13 Standards, Criteria and Guidance 40
1.14 Sustainability and Green Remediation 40
1.15 Electronic Submissions 41

CHAPTER 2 SAMPLING, ANALYSIS AND QUALITY ASSURANCE

2.1 Sampling and Analysis Requirements 43
2.2 Reporting Requirements 47
2.3 Quality Assurance Requirements 49
2.4 Quality Assurance Project Plan 50

CHAPTER 3 SITE CHARACTERIZATION AND REMEDIAL INVESTIGATION

3.1 Site Characterization and Remedial Investigation Overview 55
3.2 General Sampling Considerations 59
3.2.1 Site Characterization 60
3.2.2 Remedial Investigation 61
3.3 Investigation Work Plans 62
3.4 Building Interiors 71
3.5 Soil
3.5.1 Site Characterization 72
3.5.2 Remedial Investigation 74
3.5.3 Soil Background Evaluation 76
3.6 Soil Vapor 79
3.7 Groundwater
3.7.1 Site Characterization 86
3.7.2 Remedial Investigation 87
3.7.3 Groundwater Background Evaluation 92

3.8. Surface water, sediments and wetlands
3.8.1 Site Characterization 94
3.8.2 Remedial Investigation 95
3.8.3 Sediment Background Evaluation 98
3.8.4 Surface Water Background Evaluation 100
3.9 Area Specific Requirements for Tanks, Storage Facilities, Water Treatment, Drainage Structures and Other Systems....101
3.10 Fish and Wildlife Resource Impact Analysis (FWRIA)
3.10.1 Part 1: Resource Characterization 109
3.10.2 Part 2: Ecological Impact Assessment 112
3.11 Historic Fill Material 113
3.12 Records Search Report 115
3.13 Site Characterization Report 116
3.14 Remedial Investigation Report 120

CHAPTER 4 REMEDY SELECTION
4.1 Remedial Goals, Objectives and Factors to Consider....125
4.2 Remedy Selection Evaluation Criteria....131
4.3 Development and Evaluation of Alternatives 136
4.4 Remedy Selection Reporting Requirements 139
4.5 Remedy Selection Decision Documentation 144

CHAPTER 5 REMEDIAL DESIGN/REMEDIAL ACTION
5.1 General 145
5.2 Remedial Design 150
5.3 Remedial Action Work Plan.... 153
5.4 Remedial Action Implementation Compliance 154
5.5 Underground Storage Tank Closure....161
5.6 Institutional Controls....165
5.7 Remedial Action Schedule and Progress Reports 169
5.8 Construction Completion Report and Final Engineering Report 171

CHAPTER 6 SITE MANAGEMENT, PERIODIC REVIEW AND CLOSEOUT
6.1 Site Management....177
6.2 Site Management Plan....180
6.2.1 Institutional and Engineering Control Plan 181
6.2.2 Monitoring Plan....183
6.2.3 Operation and Maintenance Plan 189
6.3 Periodic Review 190
6.4 Remedial Process Closure Requirements....195
6.5 Site Closeout....202

TABLES

Table 1.5	Identification of Persons Certifying and Required Certifications	21
Table 1.12	Exposure Scenario Receptors and Pathways	39
Table 3.9	Sampling Frequency Based on Tank Capacity and/or Length	104
Table 5.4(e)4	Reuse of Soil from a Site	159
Table 5.4(e)10	Recommended Number of Soil Samples for Soil Imported To or Exported From a Site	161

APPENDICES 203

APPENDIX 1	1A	NYSDOH Generic Community Air Monitoring Plan	204
	1B	Fugitive Dust and Particulate Monitoring	207
	1C	DEC Permits Subject to Exemption	209
APPENDIX 2	2A	The Role of Field-Testing Technologies in Site Investigation and Remediation	210
	2B	Guidance for Data Deliverables and the Development of Data Usability Summary Reports	213
APPENDIX 3	3A	Records Search Requirements	216
	3B	NYSDOH Qualitative Human Health Exposure Assessment	220
	3C	FWRIA Decision Key	222
APPENDIX 4		FWRIA Part 3: Ecological Effects of Remedial Alternatives	223
APPENDIX 5		Allowable Constituent Levels for Imported Fill or Soil	224

DEC Website

All references to DEC's website are available at the following address:
http://www.dec.ny.gov/regulations/67386.html

Document Format Naming Convention

Chapter 1
- Section 1.1
  - Subsection 1.1.1
    - Subdivision (a)
      - Paragraph 1.
        - subparagraph i.
          - clause (1)
            - subclause (A)

This Page Intentionally Left Blank

CHAPTER 1 GENERAL INFORMATION

1.1 Scope

(a) This program policy provides guidance for the New York State Department of Environmental Conservation (DEC) Division of Environmental Remediation (DER) and regulated entities on how to conduct acceptable investigation and remediation. No provision of this guidance document should be construed to limit DER's authority to require additional investigation and/or remediation based upon site-specific conditions.

(b) This document presents guidance relative to activities considered necessary to investigate and remediate contamination at any applicable site, as identified in section 1.2.

1. Adherence to this guidance does not relieve any remedial party from:

i. complying with more stringent requirements or provisions imposed by any other federal, state or local applicable statutes or regulations;

ii. obtaining any and all permits required by federal, state or local statute or regulation, except for those described in section 1.10; and

iii. compliance with an existing order, agreement, contract or permit.

2. This guidance document does not apply to emergency interim remedial measures, which are described in subdivision 1.11(b).

(c) No provisions of this guidance should be construed to alter the requirements of Navigation Law or the Environmental Conservation Law (ECL) or any regulation promulgated pursuant thereto.

(d) Pursuant to 6 NYCRR 375-1.11(b)(2), it is a violation to engage in any activity that will, or that is reasonably anticipated to prevent or interfere significantly with any proposed, ongoing or completed remedial program at any site or foreseeable to expose the public health and the environment to a significantly increased threat of harm or damage at any site.

1.2 Applicability

(a) Applicable programs. Sites and activities subject to this guidance are those being conducted pursuant to the DER oversight document identified by paragraphs (d)1, 2, 3, 4, 6 and 7 below or a federal oversight document as set forth in paragraph (d)5 below.

1. The New York State Inactive Hazardous Waste Disposal Site Remedial Program (State Superfund Program or SSF), as defined by ECL, Article 27, Title 13, except for emergency IRMs.

2. The New York State Environmental Restoration Program (ERP), as defined by ECL, Article 56, Title 5.

3. The New York State Brownfield Cleanup Program (BCP), as defined by ECL, Article 27, Title 14.

4. The New York State Voluntary Cleanup Program (VCP), which stopped accepting new applications as of October 31, 2003.

5. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by Superfund Amendments and Reauthorization Act of 1986 (Federal Superfund) Program.

6. For any other approved remedial programs implemented or overseen by DER.

(b) Other programs. Sites and activities in the programs identified in this subdivision may be subject to this guidance on a site-specific basis when the nature and extent of contamination and/or complexity of the issues warrant the use of this guidance. The determination of applicability may be made by DER, and where such determination is made, it will be incorporated in an oversight document, in accordance with subdivision 1.2(d).

1. Remediation of petroleum contamination pursuant to Article 12 of the Navigation Law.

2. The Petroleum Bulk Storage Program, as defined by ECL, Article 17, Title 10.

3. The Chemical Bulk Storage Program, as defined by ECL, Article 40, Title 1.

4. Any other approved remedial programs implemented or overseen by DER.

(c) Applicable projects. DER-10 is applicable to projects as set forth in this subdivision.

1. Except as provided in paragraph 2 below, this guidance is applicable to work plans and reports for all projects in the programs set forth in subdivision (a) above, and as applicable to (b) above.

2. For any approved work plan which is being implemented, as well as any report submitted relative to that work, as of the effective date of this guidance, DER may evaluate the work completed to determine whether the work performed was completed in substantial compliance with this guidance. For example if a remedial investigation (RI) did not evaluate soil vapor intrusion, as set forth in section 3.6, additional work may be necessary in order for the RI to be approved. Subsequent work plans would be subject to this guidance.

3. To the extent that additional work may be necessary to address conditions at a site, or where re-openers pursuant to any certificate of completion or closure letter issued by DEC are triggered, this guidance will be considered at a site where the remedial program has been previously completed, for such required work.

(d) Oversight documents. DER will only review and approve remedial program activities subject to this guidance which are conducted pursuant to an oversight document as set forth in this subdivision.

1. For the SSF, an oversight document may include: an Administrative Consent Order or an order issued by the Commissioner pursuant to ECL 27-1313.3.a.

2. For the ERP, after approval of an application by DEC, a State Assistance Contract is

executed by the municipality proposing the project and DEC, pursuant to ECL 56-0503.

3. For the BCP, after approval of an application by DEC a brownfield site cleanup agreement executed between the applicant and DEC, pursuant to ECL 27-1409.

4. For the VCP, after approval of an application, an oversight document may include: a voluntary cleanup agreement executed by the volunteer and DEC.

5. For Federal Superfund sites, federal consent decrees, administrative orders on consent are entered into or unilateral orders are issued pursuant to CERCLA.

6. For the programs identified in subdivision (b) above, an order on consent or stipulation pursuant to Article 12 of the Navigation Law would be executed, except for underground storage tank closures performed pursuant to section 5.5, which are exempt from this requirement.

7. For any other remedial programs implemented or overseen by DER, a Department-approved oversight document.

1.3 Definitions

(a) Many of the definitions set forth in this section are derived from either the ECL or 6 NYCRR 375 and these are identified with a reference following the definition. Should changes to the definition in either source be made, the applicable new definition is to be used.

1. In addition to the definitions of words and terms used in this guidance in this section, a glossary of terms specific to quality assurance and analytical methods is included in section 2.4

2. Acronyms for the various rules and regulations cited are provided on the DEC website.

(b) The following words and terms, when used in this guidance, will have the meanings set forth below, unless the context clearly indicates otherwise.

1. **"Area of concern" or "AOC"** means any existing or former location at a site where contaminants are known or suspected to have been discharged which is considered a source area. These include locations where contaminants were generated, manufactured, refined, transported, stored, handled, treated, disposed or where they have or may have migrated.

2. **"Concentrated solid or semi-solid hazardous wastes"** means solid or semi-solid hazardous wastes present in surface or subsurface soil, surface water, sediment or groundwater in a concentrated form, such as precipitated metallic salts, metal oxides, or chemical sludges. [see 6 NYCRR 375-1.2(f)]

3. **"Confirmation sample"** means a sample taken during the course of a remedial action to determine whether cleanup requirements have been achieved or whether further remediation is required. For a final delineation sample, the analysis must be by an ELAP-accredited laboratory.

4. **"Contaminant"** means hazardous waste and/or petroleum as such terms are defined in paragraphs 25 and 43 below. [see 6 NYCRR 375-1.2(g)]

5. **"Contamination" or "contaminated"** means the presence of a contaminant in any environmental media, including soil, surface water, sediment, groundwater, soil vapor, ambient air or indoor air. [see 6 NYCRR 375-1.2(h)]

6. **"Data Usability Summary Report" or "DUSR "** means a document that provides a thorough evaluation of the analytical data to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and use.

7. **"Days"** means calendar days. [see 6 NYCRR 375-1.2(i)]

8. **"Dense Non-Aqueous Phase Liquid" or "DNAPL"** means a liquid contaminant that is denser than water and does not dissolve or mix easily in water. DNAPL is a non-aqueous phase or immiscible liquid which remains as a separate phase or layer and has a specific gravity greater than water. A DNAPL has the potential to sink through a formation until it pools on a confining unit or is immobilized as a residual. Unlike LNAPLs, DNAPLs may flow down the slope of the aquifer bottom independent of the direction of the hydraulic gradient.

9. **"Deed restriction"** means an encumbrance on the property that controls the use of the property. The restriction runs with the land in favor of the State and contains the use restriction(s) and/or any prohibition(s) on the use of land in a manner inconsistent with engineering controls.

10. **"DER"** means DEC's Division of Environmental Remediation.

11. **"Disposal"** means the abandonment, discharge, deposit, injection, dumping, spilling, leaking or placing of any contaminant so that such contaminant or any related constituent thereof may enter the environment. Disposal also means the thermal destruction of a contaminant and the burning of a contaminant as fuel for the purpose of recovering usable energy. [see 6 NYCRR 375-1.2(k)]

12. **"Documentation sample"** means a sample taken after remedial action is complete to document the level of contamination remaining. For example, if the remedial objective specifies the treatment or removal of a specific volume of soil instead of a cleanup level, documentation samples are taken so that the level of any remaining contaminants is known. For a final delineation sample, the analysis must be by an ELAP-accredited laboratory.

13. **"Ecological resources"** means all flora and fauna and the habitats (natural or human-made) that support them, excluding such biota as pets, livestock, agricultural and horticultural crops. Ecological resource may include:

i. endangered species, threatened species and species of special concern listed by DEC as provided in 6 NYCRR 182 and 193.3;

ii. a significant coastal fish and wildlife habitat that is designated by New York State under Article 42 of the Executive Law and regulated under 19 NYCRR 602.5(a);

iii. a significant habitat or ecological communities designated by the New York State Natural Heritage Program; or

iv. a wild, scenic or recreational river or river segment designated under ECL Article 15 and regulated under 6 NYCRR 666.4.

14. **"Emergency"** means a spill, or other event or condition, whether natural or human-made, as a result of which a release or threatened release of contamination presents an immediate threat to life, health, property, or natural resources. [see 6 NYCRR 375-1.2(n)]

15. **"Emergency response action" or "Emergency interim remedial measure"** means an action taken which requires immediate containment and/or remedial actions to ensure that a release or potential release does not threaten the immediate health and safety of humans and/or the environment.

16. **"Engineering control" or "EC"** means any physical barrier or method employed to actively or passively contain, stabilize, or monitor contamination, restrict the movement of contamination to ensure the long-term effectiveness of a remedial program, or eliminate potential exposure pathways to contamination. Engineering controls include, but are not limited to, pavement, caps, covers, subsurface barriers, vapor barriers, slurry walls, building ventilation systems, fences, access controls, provision of alternative water supplies via connection to an existing public water supply, adding treatment technologies to such water supplies, and installing filtration devices on private water supplies. [see 6 NYCRR 375-1.2(o)]

17. **"Environment"** means any water including surface or groundwater, sediment, water vapor, any land including land surface or subsurface, air including soil vapor, fish, wildlife, other biota, all other natural resources and humans. [see 6 NYCRR 375-1.2(p)]

18. **"Environmental easement"** means an interest in real property, created under and subject to the provisions of ECL Article 71, Title 36 which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls, provided that no such easement shall be acquired or held by the state which is subject to the provisions of article 14 of the constitution of the State of New York. [see 6 NYCRR 375-1.2(q)]

19. **"Exposure pathway"** means the route through which a human or biota may come into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure, and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

20. **"Feasible"** means suitable to site conditions, capable of being successfully carried out with available technology, implementable and cost effective. [see 6 NYCRR 375-1.2(s)]

21. **"Final engineering report" or "FER"** means a report prepared to document implementation of the complete remedial program, including the necessary certifications for it. The scope of the FER will vary to reflect the manner in which the remedial program was implemented for the entire site.

22. **"Free product"** means an immiscible non-aqueous phase liquid, other than a DNAPL, present as a liquid, in surface or sub-surface soil, surface water or groundwater in a potentially mobile state.

23. **"Grossly contaminated media"** means soil, sediment, surface water or groundwater which contains sources or substantial quantities of mobile contamination in the form of NAPL that is identifiable either visually, through strong odor, by elevated contaminant vapor levels or is otherwise

readily detectable without laboratory analysis. [see 6 NYCRR 375-1.2(u)]

24. **"Groundwater"** means water below the land surface in a saturated zone of soil or rock. This includes perched water separated from the main body of groundwater by an unsaturated zone. [see 6 NYCRR 375-1.2(v)]

25. **"Hazardous waste"** means a waste which appears on the list or satisfies the characteristics promulgated by the Commissioner pursuant to ECL 27-0903 and any substance which appears on the list promulgated pursuant to ECL 37-0103; provided, however, that the term "hazardous waste" does not include:

i. natural gas, natural gas liquids, liquefied natural gas, synthetic gas usable for fuel, or mixtures of natural gas and such synthetic gas; nor

ii. the residue of emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine; nor

iii. source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established under section 170 of such act (42 USC 2210) or, for the purpose of section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or any other response action, any source, byproduct, or special nuclear material from any processing site designated under section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978 (42 USC 7912(a)(1) or 7942(a); nor

iv. petroleum as defined in paragraph 44 below, even if appearing on the list promulgated pursuant to ECL 37-0103. [see 6 NYCRR 375-1.2(w)]

26. **"Historic fill material"** means non-indigenous or non-native material, historically deposited or disposed in the general area of, or on, a site to create useable land by filling water bodies, wetlands or topographic depressions, which is in no way connected with the subsequent operations at the location of the emplacement, and which was contaminated prior to emplacement. Historic fill may be solid waste including, but not limited to, coal ash, wood ash, municipal solid waste incinerator ash, construction and demolition debris, dredged sediments, railroad ballast, refuse and land clearing debris, which was used prior to October 10, 1962. Any soil or soil-like wastes from any area which was operated by a municipality or other person as a landfill is not considered historic fill. For purposes of a remedial program, historic fill does not include any material which is chemical production waste or waste produced on the site from processing of metal or mineral ores, residues, slag or tailings. [see 6 NYCRR 375-1.2(x)]

27. **"Inorganic analyte" or "metal"** means non-organic compounds/elements as identified as target analyte list analytes in the United States Environmental Protection Agency (USEPA) "Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration" (ILM05.3) and also identified in Part II of Exhibit C of the current DEC Analytical Services Protocol.

28. **"Institutional control" or "IC"** means any non-physical means of enforcing a restriction on the use of real property that limits human or environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or members of the public, or prevents actions that would interfere with the effectiveness of a remedial program or with the effectiveness and/or integrity of site management activities at or pertaining to a site. [see 6 NYCRR 375-1.2(aa)]

29. **"Interim remedial measure" or "IRM"** means activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation and evaluation, to prevent, mitigate or remedy environmental damage or the consequences of environmental damage attributable to a site, including, but not limited to, the following activities: construction of diversion ditches; collection systems; drum removal; leachate collection systems; construction of fences or other barriers; installation of water filters; provision of alternative water systems; the removal of source areas; or plume control. [see 6 NYCRR 375-1.2(ab)]

30. **"Light non-aqueous-phase liquid" or "LNAPL"** means a liquid contaminant that is lighter than water and does not dissolve or mix easily in water. LNAPL is a non-aqueous-phase or immiscible liquid which remains as a separate phase or layer and has a specific gravity less than water. Because LNAPLs are less dense than water, they tend to float on top of the water table and are also commonly referred to as a floating product.

31. **"Monitored natural attenuation" or "MNA"** is the process by which a natural systems ability to attenuate contaminant(s) at a specific site is confirmed, monitored and quantified. Contaminant concentrations may attenuate in natural systems through biodegradation; sorption; volatilization; radioactive decay; chemical or biological stabilization; transformation; dispersion; dilution and/or the destruction of contaminants.

32. **"Natural resource"** means all land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the State.

33. **"Natural resource damages" or "NRD"** means the amount of money necessary to restore, rehabilitate, replace or otherwise compensate for the injury to, destruction of, loss of or loss of use of natural resources, including the reasonable costs of assessing or determining the damage, which shall be recoverable by the designated trustees for natural resources pursuant to the CERCLA.

34. **"Natural resource injury"** means an observable (i.e. qualitative) or measurable (i.e. quantitative) adverse change in a natural resource or any impairment of a human or ecological service provided by that resource relative to baseline, reference, or control conditions.

35. **"Non-aqueous-phase liquid" or "NAPL"** means a contaminant that is a liquid which may be denser or lighter than water and does not mix easily or dissolve in water, but remains as a separate phase. [see 6 NYCRR 375-1.2(ac)]

36. **"NYSDOH"** means the New York State Department of Health.

37. **"Off-site contamination"** means any contamination which has emanated from a remedial site beyond the real property boundaries of such site, via movement through air, indoor air, soil, surface water or groundwater. [see 6 NYCRR 375-1.2(ad)]

38. **"On-site contamination"** means any contamination located within the real property boundaries of a remedial site. [see 6 NYCRR 375-1.2(ae)]

39. **"Operable unit"** means a portion of the remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat

of release or exposure pathway resulting from the site contamination. Operable units may address geographical portions of a site, media-specific action, specific site problems or an initial phase of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site. An operable unit may be proposed by DEC or a remedial party; however, only DEC can approve the use of operable units. [see 6 NYCRR 375-1.2(af)]

40. **"Oversight document"** means any order, agreement, stipulation or state assistance contract entered into by DEC as set forth in subdivision 1.2(d) of this guidance to define the role of a person implementing in the investigation and/or remediation of a site or area(s) of concern.

41. **"Periodic review report" or "PRR"** means a report which evaluates the institutional and engineering controls, summarizes any monitoring results and/or evaluates any operation and maintenance activities.

42. **"Person"** means an individual, trust, firm, joint stock company, limited liability company, corporation, joint venture, partnership, association, state, municipality, commission, political subdivision of a state, public benefit corporation or any interstate body. Provided however, a person shall not include a person as defined in ECL 27-1323. [see 6 NYCRR 375-1.2(ag)]

43. **"Petroleum" or "Oil"** means petroleum as defined by Article 12 Section 172 of the NYS Navigation Law or Article 17, Title 10 of the ECL, specifically oil or petroleum of any kind and in any form including but not limited to, oil, petroleum, fuel oil, oil sludge, oil refuse, oil mixed with other wastes and crude oils, gasoline, kerosene and dielectric fluids. For purposes of this guidance, oil includes mineral oils or any other oil for which an investigation and/or remediation is determined necessary by DER to address a spill discharge or any disposal impacting public health and the environment.

44. **"Petroleum remediation project"** means those petroleum related sites which are determined to be subject to this guidance in accordance with paragraphs 1.2(b)1 and 2.

45. **"Plume-management monitoring" or "PMM"** is the process by which a dissolved groundwater plume, which has yet to reach equilibrium with the processes of natural attenuation, is monitored to ensure that it does not cause an unacceptable impact.

46. **"Presumptive remedy"** means technologies or approaches appropriate for the remediation of specific types of contamination which, based on historical patterns of remedy selection and DEC's scientific and engineering evaluation of performance data, can be used to accelerate the remedy selection process. [see 6 NYCRR 375-1.2(ai)]

47. **"Professional engineer" or "PE"** means an individual or firm licensed or otherwise authorized under article 145 of the education law of the State of New York to practice engineering. [see 6 NYCRR 375-1.2(aj)]

48. **"Project manager"** means the DER staff member with primary responsibility for ensuring that an investigation or remediation was completed in accordance with the applicable sections of this guidance, using appropriate professional judgment and experience to ensure the goals and objectives of a given remedial program are achieved.

49. **"Qualified environmental professional"** means a person, including a firm headed by such person, who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding the presence of releases or threatened releases to the surface or subsurface of a site or off-site areas, sufficient to meet the objectives and performance factors for the areas of practice identified by this guidance. Such a person must:

i. hold a current professional engineer's or a professional geologist's license or registration and have the equivalent of three (3) years of full-time relevant experience in site investigation and remediation of the type detailed in this guidance; or

ii. be a site remediation professional licensed or certified by the federal government, a state or a recognized accrediting agency, to perform investigation or remediation tasks identified by this guidance, and have the equivalent of three (3) years of full-time relevant experience. Examples of such license or certificate include the following titles:

(1) Licensed Site Professional, by the State of Massachusetts;

(2) Licensed Environmental Professional, by the State of Connecticut;

(3) Qualified Environmental Professional by the Institute of Professional Environmental Practice; or

(4) Certified Hazardous Materials Manager, by the Institute of Hazardous Materials Management.

50. **"Qualitative exposure assessment"** means an evaluation to determine the route, intensity, frequency, and duration of actual or potential exposures of humans and/or fish and wildlife to contaminants.

51. **"Quality assurance"** means the total integrated program for assuring the reliability of monitoring and measurement data which includes a system for integrating the planning, assessment and improvement efforts to meet data end use data quality requirements.

52. **"Quality assurance project plan" or "QAPP"** means a document which presents in specific terms the policies, organization, objectives, functional activities and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of a specific project or operation.

53. **"Quality control"** means the routine application of procedures for attaining prescribed standards of performance in the monitoring and measurement process.

54. **"Receptor"** means any humans or biota which are, or may be expected to be, or have been, exposed to or affected by a contaminant from a site.

55. **"Regulated wetland"** means any tidal or freshwater wetland regulated by New York State under ECL Articles 15, 24 and 25 and as defined in 6 NYCRR 608.5, 661.4(hh) and 663.2(p)

56. **"Release"** means any pumping, pouring, emitting, emptying or leaching, directly or indirectly, of a contaminant so that the contaminant or any related constituent thereof, or any degradation product of such a contaminant or of a related constituent thereof, may enter the environment, or the disposal of any contaminant. [see 6 NYCRR 375-1.2(am)]. This includes discharges from a pipe, except discharges pursuant to and in compliance with the conditions of a valid state or

federal permit, in addition to those discharges exempted from a permit, in accordance with 6 NYCRR 375-1.12.

57. **"Remaining contamination"** means contamination which is left in media at a site following implementation of the remedy.

58. **"Remedial action"** means those actions taken at or near a site as may be required by DER, including, without limitation, sampling, removal, treatment, containment, transportation, securing, or other engineering or institutional controls, whether of a permanent nature or otherwise, designed to ensure that any discharged contaminant is remediated in compliance with the applicable decision document, pursuant to Chapter 5 of this document.

59. **"Remedial investigation" or "RI"** means a process undertaken to determine the nature and extent of contamination at a site or operable unit of a site. The RI emphasizes data collection and site characterization (SC), and generally is performed in support of the selection of a remedy. The scope of a RI is more fully described at 6 NYCRR 375-1.8(e) and in Chapter 3.

60. **"Remedial party"** means a person implementing a remedial program at a remedial site pursuant to an oversight document as set forth in 1.2(d). [Note: Actions required of the remedial party may also be undertaken by the person(s) (for example, a contractor or consultant) actually undertaking the investigation and/or remediation for a site owner, responsible party, volunteer, by the USEPA for federally funded sites or by DER for state funded sites.]

61. **"Remedial program"** means all activities undertaken to investigate, design, eliminate, remove, abate, control, or monitor existing health hazards, existing environmental hazards, potential health hazards, potential environmental hazards in connection with a site, and all activities including, but not limited to, the following undertaken to manage waste and contamination from a site:

i. SC and RI activities needed to develop and evaluate remedial alternatives;
ii. interim remedial measures;
iii. design activities;
iv. remedial actions, including, but not limited to, construction related activities and the implementation of remedial treatment technologies, including without limitation grading, contouring, trenching, grouting, capping, excavation, transporting, incineration and other thermal treatment, chemical treatment, biological treatment, or construction of groundwater and/or leachate collection and treatment facilities;
v. post-remedial site management including, but not limited to, the operation, maintenance, monitoring of remedial treatment technologies, and the certification of institutional and engineering controls;
vi. restoration of the environment;
vii. appropriate involvement by local governments and by the public; and
viii. oversight by DEC. [see 6 NYCRR 375-1.2(ap)]

62. **"Remedial site" or "Site"** means any real property consisting of a parcel, adjacent properties or parcels, or portions of properties or parcels, identified as:

i. a property being addressed under the inactive hazardous waste disposal site program (SSF);
ii. a brownfield site;

iii. an environmental restoration project, as defined by the state assistance contract;
iv. a voluntary cleanup site;
v. a petroleum remediation project; or
vi other projects identified pursuant to 1.2(a)6.

63. **"Restricted use"** means a use of a site with imposed restrictions (e.g., environmental easements, deed restrictions) which as part of the remedy selected for the site require a SMP which relies on institutional or engineering controls to manage exposure to contamination remaining at a site. Restricted use can include residential, restricted residential, commercial or industrial uses.

64. **"Sediment"** means unconsolidated particulate material found at the bottom of lakes, rivers, streams and other water bodies at bed elevations equal to or lower than the mean high water level as defined in 6 NYCRR 608.1(r). [Note: Materials present in enclosed sumps, sewers or piping systems not accessible to fish and wildlife and not forming any benthic or aquatic habitat are not considered sediments for the purpose of comparison to DEC's *Technical Guidance for Screening Contaminated Sediment*.]

65. **"Semi-volatile organic compound" or "SVOC"** means organic compounds amenable to analysis after extraction of the sample with an organic solvent. For the purposes of this guidance, semi-volatiles are those target compound list compounds identified in the USEPA *Contract Laboratory Program Statement of Work for Organics Analysis; Multi-Media, Multi-Concentration* (OLM04.2) and also identified in Part I of Exhibit C of the current DEC Analytical Services Protocol.

66. **"Site characterization" or "SC"** means the first phase in the process of identifying areas of concern at a site, which is conducted pursuant to Chapter 3 of this guidance.

67. **"Site management"** means the activities undertaken as the last phase of the remedial program at a site which continue after a certificate of completion (closure letter) is issued. Site management is conducted in accordance with a site management plan, which identifies and implements the institutional and engineering controls required for a site, as well as any necessary monitoring and/or operation and maintenance of the remedy. [see 6 NYCRR 375-1.2(at)]

68. **"Site management plan" or "SMP"** means a document which details the institutional and engineering controls required for a site and any physical components of the remedy required to be operated, maintained and monitored to assure continued effectiveness, developed pursuant to Chapter 6.

69. **"Site-specific background concentration"** means the concentration of an element, chemical or contaminant in an environmental medium present at a site that has been determined following an approved sampling and analysis plan to be either due to natural conditions or to be widespread regionally and not attributable to the site.

70. **"Source area" or "source"** means a portion of a site or area of concern at a site where the investigation has identified a discrete area of soil, sediment, surface water or groundwater containing contaminants in sufficient concentrations to migrate in that medium, or to release significant levels of contaminants to another environmental medium, which could result in a threat to public health and the environment. A source area typically includes, but is not limited to, a portion of a site where a substantial quantity of any of the following is present:

i. concentrated solid or semi-solid hazardous substances;
ii. non-aqueous phase liquids; or
iii. grossly contaminated media. [see 6 NYCRR 375-1.2(au)]

71. **"Standards, Criteria and Guidance" or " SCGs"** mean standards and criteria that are generally applicable, consistently applied, and officially promulgated, that are either directly applicable, or that are not directly applicable but are relevant and appropriate, unless good cause exists why conformity should be dispensed with, and with consideration being given to guidance determined, after the exercise of scientific and engineering judgment, to be applicable. This term incorporates both the CERCLA concept of "applicable or relevant and appropriate requirements" (ARARs) and the EPA's "to be considered" (TBCs) category of non-enforceable criteria or guidance. The most common applicable SCGs are identified on the DEC website identified in the table of contents. For purposes of this Guidance, "soil SCGs" means the soil cleanup objectives and supplemental soil cleanup objectives identified in 6 NYCRR 375-6.8 and the Commissioner Policy on *Soil Cleanup Guidance* (CP-Soil).

72. **"Substantive technical permit requirements"** means those requirements that have a direct bearing on the action to be taken and relate to the technical (scientific) aspects of the action rather than the administrative procedures of obtaining a permit. Also see section 1.10.

73. **"Toxicity assessment"** means a field study, laboratory study and/or literature review conducted to determine the concentration at which a contaminant becomes toxic to an individual or an organism. A contaminant is considered toxic if it causes death, morbidity or sub-lethal effects on growth, reproduction, behavior or physiology of an organism, whether through direct or indirect toxicity or through bioaccumulation.

74. **"Underground storage tank"** means any tank or other vessel that has at least 10 percent of its volume underground. Tanks in subterranean vaults accessible for inspections are not considered underground storage tanks.

75. **"Unrestricted use"** means use without imposed restrictions such as environmental easements, deed restrictions or other land use controls.

76. **"Volatile organic compound" or "VOC"** means organic compounds as identified as target compound list compounds in the USEPA *Contract Laboratory Program Statement of Work for Organics Analysis; Multi-Media, Multi-Concentration"* (OLM04.2) or identified in Part I of Exhibit C of the current DEC Analytical Services Protocol.

77. **"Waste"** means any garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, whether or not such material may eventually be used for some other purpose, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations or from community activities, and source, special nuclear or by-product material as defined in the Atomic Energy Act of 1954, as amended, except as may be provided by existing agreements between the State of New York and the government of the United States, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under ECL Article 17. [see 6 NYCRR 375-1.2(aw)]

78. **"Waste oil"** means used engine lubricating oil or any other oil, including but not limited

to: fuel oil, motor oil, hydraulic fluid, dielectric fluid, gear oil, cutting oil, transmission fluid, oil storage tank residue, animal oil and vegetable oil, which has been contaminated by physical and/or chemical impurities and has not been subsequently refined.

79. **"Waters"** means all lakes, bays, sounds, ponds, impounding reservoirs, groundwater, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State of New York and all other bodies of water, natural or artificial, inland or coastal, fresh or salt, public or private, which are wholly or partially within or bordering the state or within its jurisdiction.

80. **"Wetland"** means any freshwater or tidal wetland including federal jurisdictional wetlands, NYS regulated wetlands and unregulated wetlands.

1.4 Notification

(a) Notification process. The remedial party, unless otherwise specified, should notify DER in the manner set forth by this subdivision.

1. These notifications should be in writing and provided in the time frames identified for the notice in subdivisions (b) to (d) below. The notification must include the following information:

i. name and address of the person responsible for implementing the remedial program;

ii. name of the site;

iii. DER site identification number;

iv. street address of the site;

v. nature of the:

(1) change of use being reported, in accordance with subdivision (b) below;
(2) element of the field activities associated with a remedial program or other planned activities subject to a SMP to be performed, in accordance with subdivision (c) below; or
(3) emergency action undertaken at the site, in accordance with subdivision (d) below; and

vi. anticipated start date of the actions identified in subparagraph v above.

2. The information required to be sent to DER should be submitted to the assigned project manager or, if no project manager is assigned, to the following address:

DEC
Division of Environmental Remediation
Site Control Section
625 Broadway
Albany, NY 12233

3. These notifications are not intended to satisfy the citizen participation requirements applicable to sites being investigated or remediated pursuant to any of the programs to which this guidance is applicable, which are provided in DER-23 *Citizen Participation Handbook for Remedial Programs.*

4. No provisions of this guidance alter the notification requirements of:

i. any statute or any regulation, including but not limited to Navigation Law 175; ECL Title 14, 17-1007, 17-1743 or 40-011; and/or

ii. an order, agreement or permit that requires notifications or any additional notices required by the applicable programs identified in subdivisions 1.2(a) or (b).

(b) Change of use notification. Notice is to be made at least 60 days before a change of use for all programs.

1. For the programs set forth in paragraphs 1.2(a)1 through 3:

i. a change of use is defined at 6 NYCRR 375-2.2(a), 3.2(d) or 4.2(b), respectively; and

ii. requires that the notice be made at least 60 days before the change of use, pursuant to the provisions of 6 NYCRR 375-1.11(d).

2. For the programs set forth in paragraphs 1.2(a)4-6 and 1.2(b)1-4 a notice consistent with the notice requirements pursuant to 6 NYCRR 375-1.11(d) is required for a change of use as defined at 6 NYCRR 375-3.2(d) at least 60 days before the change of use.

(c) Notification regarding the start of any field activities associated with a remedial program, including those planned activities conducted during site management. Notice is to be made seven (7) calendar days prior to the actual start of any such field activities. The notice is to be made in accordance with subdivision (a) above and include a schedule of the work. Subsequent 7-day notices and work schedules will be required where the work is to proceed in phases not subject to the initial schedule provided.

1. Field activities associated with an ongoing remedial program for which a schedule has been approved as part of a work plan prepared pursuant to this guidance, where the schedule is current, are exempted from this additional reporting.

2. The remedial party must also notify DEC's Division of Fish Wildlife and Marine Resources at least 7 calendar days prior to the initiation of any field work or biota sampling related to the Fish and Wildlife Resources Impact Analysis (FWRIA). The notification should contain the

information listed in (a)1 above.

3. Any action undertaken as part of the ongoing site management (e.g., an excavation plan) not considered an emergency action in accordance with subdivision (d) below, requires notification to the parties set forth in subdivision (a) above, and must include:

i. a detailed description of the work, including:

(1) plans for any intrusive elements or utilities to be installed in the subsurface prior to the implementation of the remedy at a site; and/or

(2) impact any engineering control or other component of the site remedy;

ii. a summary of environmental conditions anticipated in the work areas, including but not limited to the nature and concentrations of contaminants of concern, and potential presence of contaminated soil or groundwater; and

iii. a schedule for the work detailing the start and completion of intrusive elements of the proposed work.

(d) Emergency action notification. Notification of actions undertaken in response to an emergency situation for which prior written notice could not be provided is to be made in accordance with 6 NYCRR 375-1.5(b)1.

1. Emergency response actions or emergency IRMs are:

i. situations as defined in paragraph 1.3(b)15; or

ii. those actions undertaken in response to the need for emergency repairs to utilities or other site infrastructure.

2. The initial verbal report is to be made by noon of the next business day, upon knowledge of any condition posing an emergency, to the regional remediation engineer for the region in which the site is located and to the identified site project manager.

3. In addition, a written notice, as set forth in subdivision (a) above, is to be provided within seven (7) business days.

(e) The remedial party must notify DER if it is determined during the investigation or remediation of the site that contamination has migrated onto such site from another property or when a spill, release or underground storage tank is identified. No provisions of this guidance should be construed to alter the notification requirements of Navigation Law 175.

1.5 Certifications

(a) All documents, which are prepared in final form in accordance with this guidance for submission to DER for approval, are to be prepared and certified in accordance with the applicable statute and/or regulations identified in section 1.2.

1. Persons preparing and certifying the various work plans and reports identified in Table 1.5 below include:

i. New York State licensed professional engineers, as defined at 6 NYCRR 375-1.2(aj) and paragraph 1.3(b)47;

ii. qualified environmental professionals as defined at 6 NYCRR 375-1.2(ak) and paragraph 1.3(b)49;

iii. remedial parties, as defined at 6 NYCRR 375-1.2(ao) and .paragraph 3(b)60; or

iv. site owners, which are the owners of the property comprising the site at the time of the certification.

2. A person who does not meet the definition of a professional engineer or a qualified environmental professional may assist in the conduct of all appropriate investigation or remediation activities in accordance with this document, if such person is under the supervision or responsible charge of a person meeting the definition provided above.

3. Other plans or reports which may be prepared for submission to DER as part of a remedial program, to which these certification requirements do not apply, include:

i. Health and safety plans. All health and safety plans submitted in response to section 1.9 are to be prepared, signed and implemented by a certified industrial hygienist by the American Board of Industrial Hygiene, a certified safety professional by the Board of Certified Safety Professionals or other qualified person pursuant to 29CFR1910.120. This requires the decision-making skills of a qualified health and safety professional with practical hazardous waste site experience. The person developing your plan should have the knowledge and skills necessary to identify and evaluate the range of hazards associated with hazardous waste site operations. In addition, this individual must be qualified to identify the appropriate monitoring and exposure controls necessary for employee protection based on the contaminants and other hazards anticipated onsite.;

ii. Fish and Wildlife Resources Impact Analysis. A FWRIA submitted pursuant to section 3.10 is to be conducted by a qualified biologist, ecologist or other qualified professional experienced in habitat assessment and assessment of contaminant impacts. The FWRIA should document the education and experience of the professional conducting the FWRIA; and

iii. when a phase I or II environmental site assessment report, prepared in accordance with the applicable ASTM standards, which was conducted prior to a site entering one of the remedial programs identified in section 1.2, is provided in lieu of a records search report, no certification beyond what may be called for by ASTM is required.

4. Table 1.5 Identification of Persons Certifying and Required Certifications.

Table 1.5 Identification of Persons Certifying and Required Certifications		
Work Plans and Reports		
Document	**Certified by**	**Certification**
1. Work plans prepared pursuant to section 3.3.	QEP	1.5(b)1
2. The following reports: i. records search reports pursuant to section 3.12; ii. site characterization reports pursuant to section 3.13; iii. site characterization investigation data summary pursuant to subdivision 3.13(f); or iv. remedial investigation reports pursuant to section 3.14.	QEP	1.5(b) 2
3. Remedy selection reports prepared pursuant to section 4.4.	NYSPE	1.5(b) 2
4. Interim remedial measure (IRM) design or an IRM design work plans for remedial treatment system, pursuant to sections 5.2 or 5.3, unless the IRM is solely for a soil vapor mitigation system as described in item 6 below.	NYSPE	1.5(b) 1
5. Remedial design work plans and remedial designs pursuant to section 5.2 or remedial action work plans pursuant to section 5.3; i. pre-design or design investigations; ii. pumping tests; and/or iii. pilot studies.	NYSPE	1.5(b) 1
6. Soil vapor mitigation systems: i. if a design or remedial work plan is required for their installation; or ii. with the approval of DER, a contractor who has met certain requirements and is trained to identify and mitigate radon intrusion in buildings may install without a design (see subdivision (c) below).	i. NYSPE ii. See 1.5(c)	i. 1.5(b) 2 ii. None
7. IRM construction completion reports, including as-built drawings, prepared pursuant to section 5.8.	NYSPE	1.5(b) 3
8. Construction completion reports for operable units or construction phases, including as-built drawings, prepared pursuant to section 5.8.	NYSPE	1.5(b) 3
9. SMPs prepared pursuant to section 6.2	NYSPE	1.5(b) 2
10. FERs, including as-built drawings, prepared pursuant to section 5.8.	NYSPE	1.5(b) 4
11. Underground storage tank closure reports for closures performed in accordance with section 5.5.	QEP	1.5(b) 2
12. Underground storage tank closure reports for the closure of underground storage tanks which are not performed pursuant to section 5.5	NYSPE	1.5(b) 3
13. Underground storage tank waiver of sampling requirements certifications prepared pursuant to clause 5.5(c)3.v.(3).	NYSPE	1.5(b) 2

Periodic Review Reports		
Document	**Certified by**	**Certification**
14. Periodic review reports prepared pursuant to subdivision 6.3(b), in those instances where an engineering evaluation of engineering controls is required to certify the IC/ECs.	NYSPE	1.5(b) 5
15. Periodic review reports prepared pursuant to subdivision 6.3(b), in those instances where an engineering evaluation of the engineering controls is not required to certify the IC/ECs.	QEP	1.5(b) 5
16. Periodic review reports prepared pursuant to subdivision 6.3(b), in those instances where the certification relates solely to land or groundwater use restrictions (i.e. there are no engineering controls and/or monitoring).	RP or SO	1.5(b) 5
17. To the certifications for 14 and 15 above, for a site under the BCP program which has been determined by DER not to represent a significant threat to public health and the environment and where contaminants in groundwater at the site boundary contravene drinking water standards: i. add the additional statement (f); and ii. in addition every five years also add statement (g).	QEP	 i. 1.5(b) 6.i ii. 1.5(b) 6.ii
QEP = Qualified Environmental Professional **NYSPE**=New York State Professional Engineer		**RP** = Remedial Party **SO** = Site Owner

(b) All reports and work plans identified in Table 1.5, prepared in accordance with this guidance, will use one of the certifications provided by this subdivision. The appropriate certification must be included on the title page of all submissions of the document (so it can be reviewed along with the rest of the document) and must be fully executed when a submission of the document is made by the remedial party to DER for approval.

1. For a work plan:

"I _____certify that I am currently a [NYS registered professional engineer or Qualified Environmental Professional as defined in 6 NYCRR Part 375] and that this Report [Remedial Design, Remedial Action Work Plan] was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).";

2. For a report/design document:

"I _____certify that I am currently a [NYS registered professional engineer or Qualified Environmental Professional as defined in 6 NYCRR Part 375] and *that this Report [Remedial Design, Remedial Action Work Plan] was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.";* or

3. For a construction completion report or a UST closure report not performed in accordance with section 5.5. The NYS registered professional engineer certifying:

i. does not have to have been personally in charge of all others engaged by the firm in the implementation of the project, rather was the person in the firm with direct responsibility for the personnel engaged in the inspection and engineering provided by the firm to assure the implementation of the project by the construction contractor was in accordance with the approved remedial design or remedial action work plan, including the engineering review of all contractor submittals and field changes approved for the project;

ii. to the implementation of the work under the firms oversight is attesting to work having been performed by the construction contractor in accordance with the approved remedial design or remedial action work plan, including the engineering review of all contractor submittals and field changes approved for the project; and

iii. will use the following certification:

"I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan (or Remedial Design or Plans and Specifications) was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan (or Remedial Design or Plans and Specifications).

If the Remedial Action Work Plan (or Remedial Design or Plans and Specifications) identifies time frames to be achieved by the remedial program, the certification must include: The data submitted to DER demonstrates that the remediation requirements set forth in the Remedial Work Plan (or Remedial Design or Plans and Specifications) and all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, are established in the work plan(or Remedial Design or Plans and Specifications)."

4. For the final engineering report. The NYS registered professional engineer certifying:

i. does not have to have been personally in charge of all others engaged by the firm in the implementation of the project, rather was the person in the firm with direct responsibility for the personnel engaged in the inspection and engineering provided by the firm to assure the implementation of the project by the construction contractor was in accordance with the approved remedial design or remedial action work plan, including the engineering review of all contractor submittals and field changes approved for the project;

ii. to the implementation of the work under the firms oversight is attesting to work having been performed by the construction contractor in accordance with the approved remedial design or remedial action work plan, including the engineering review of all contractor submittals and field changes approved for the project; and

iii. will use the following certification:

"I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan (or Remedial Design or Plans and Specifications) was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan (or Remedial Design or Plans and Specifications).

If the Remedial Action Work Plan (or Remedial Design or Plans and Specifications) identifies time frames to be achieved by the remedial program, the certification must include: The data submitted to DER demonstrates that the remediation requirements set forth in the Remedial Work Plan (or Remedial Design or Plans and Specifications) and all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in the work plan (or Remedial Design or Plans and Specifications)."

If the remedial program requires ICs or ECs, the certification must include: *"All use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded."*

If the remedial program requires applicable SMP, the certification must include: *"A Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER."*

If the remedial program requires financial assurance, the certification must include: *"Any financial assurance mechanisms required by DEC pursuant to Environmental Conservation Law have been executed."*

5. For the periodic review report for those site remedial programs undertaken pursuant to subdivision 1.2(a), where an institutional control/engineering control (IC/EC) certification is to be provided:

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

(a) 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 DER;

(b) nothing has occurred that would impair the ability of such control to protect public health and the environment;

(c) nothing has occurred that would constitute a violation or failure to comply with any Site Management Plan for this control;

(d) access to the site will continue to be provided to DER to evaluate the remedy, including access to evaluate the continued maintenance of this control; and

(e) if a financial assurance mechanism is required under the oversight

document for the site, the mechanism remains valid and sufficient for their intended purpose under the document [certifier may delete this clause if no financial assurance is required for the remedial program and re-letter the certification accordingly].

6. For a site in the BCP program, which DER has been determined does not represent a significant threat to public health and the environment and where contaminants in groundwater at the site boundary contravene drinking water standards:

i. the following statement (f) will be added to the certification identified in paragraph 5 above:

"(f) no new information has come to the remedial party (site owners) attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of offsite contamination are no longer valid "; and

ii. in addition every five years the following statement (g) will be added to the certification:

"(g) the assumptions made in the qualitative exposure assessment remain valid".

(c) Exemption for the design of soil vapor mitigation systems. As noted in Table 1.5 line 6, an exemption is available whereby a contractor who has met the certification requirements of this subdivision and is trained to identify and mitigate radon intrusion into buildings, with the approval of DER, may install such systems without a design prepared and certified by a NYS professional engineer.

1. The certifications required are:

i. Certified Residential Mitigation Provider, by the National Environmental Health Association - National Radon Proficiency Program; or

ii Certified Radon Mitigation Specialist, by the National Radon Safety Board.

2. This exemption applies solely to the installation of a mitigation system without a design, if any structural modifications are necessary to the building requiring mitigation, a NYS PE prepared and certified design will be required.

1.6 Documenting Compliance with the Technical Guidance

(a) All remedial program activities conducted are to be documented and included in reports which follow the format and contain the information described in the reporting sections of Chapters 2 through 6 and be certified as set forth in section 1.5.

1. If a report has previously been submitted to DEC pursuant to another DEC regulatory program, the previously submitted report may be submitted to DER to satisfy the applicable

requirements.

2. Multiple reports may be combined into a single report.

(b) The remedial party is to submit work plans and reports pursuant to the schedule contained in the oversight document and they should comply with the format and contain the information described in Chapters 2 through 6 of this document.

(c) To provide flexibility for the investigation and remediation, DER has identified certain limited situations where alternate sampling, analytical or investigatory methods may be used with DER pre-approval.

1. The alternate methods are to be documented in the appropriate work plan. The decision whether to grant the request rests solely with DER.

2. DER will evaluate an alternate method in terms of its site-specific application, based upon the documentation provided and other appropriate information available to DER. DER will consider the extent to which the alternate method:

i. has previously been used successfully by DER or USEPA Region 2 in New York State in similar situations;

ii. reflects current technology as documented in peer-reviewed professional journals;

iii. provides results which are verifiable and reproducible;

iv. can be expected to achieve the same results or objectives as the method which it proposes to replace;

v. furthers the attainment of the goals of the specific remedial phase for which it is used; and

vi. ensures the investigation and/or remediation of a site is conducted in a manner which is protective of public health and the environment.

3. A request to use alternate methods should be initiated by the remedial party and should include:

i. the name and address, unless all are the same, of the person:

(1) submitting the request; and
(2) conducting the investigation and/or remediation;

ii. a description of the proposed alternate approach;

iii. applicable citation from this document;

iv. a description of site-specific conditions applicable to the request;

v. the technical basis for the request pursuant to this document; and
vi. any other information or data DER requests to thoroughly evaluate the request.

(d) Verbal approvals of alternative methods (e.g., field decisions) may also be granted and these field decisions should be documented as detailed in paragraph 3.2.1(c)4.

1.7 Considerations for Going Beyond the Technical Guidance

(a) DER may request additional work beyond the technical guidance set forth in this document to ensure an appropriate investigation and/or remediation of the site.

1. Reasons for such additional work include:

i. the complexity of the site geology, hydrogeology, contaminated media and/or proximity to receptors;

ii. the number or magnitude of the disposal site or areas of concern being investigated;

iii. the nature of the contaminants disposed;

iv. a change in the certification or other authorization of the laboratory performing analyses previously submitted for the site in question or any other site;

v. the identification of exposure pathways not otherwise fully investigated pursuant to these requirements;

vi. the identification of receptors not otherwise fully investigated pursuant to these requirements;

vii. distance to and sensitivity of receptors and natural resources;

viii. when DER determines that additional data or information is needed to fully evaluate or remediate the nature and extent of contamination at the site;

ix. when additional work is required pursuant to any applicable statute or regulation, including 6 NYCRR 375; and

x. any other conditions DER identifies which necessitate the need for additional activities.

2. DER may also request the use of alternative methods where the alternative method satisfies the conditions set forth in paragraph 1.6(c)2.

(b) Natural resource damages (NRD). The remedial party may elect to examine the issue of potential NRD liability early on in the remedial process. If the remedial party wishes to address their potential NRD liability at any time prior to the submission of a fish and wildlife resources impact analysis (FWRIA) Part 1, they should contact DEC's Office of General Counsel.

(c) Radiation. Should the remedial party or DER suspect radioactive contamination on a site, the guidance in this document may not be appropriate and alternative methods for assessing site conditions may need to be considered. Such sites will be investigated and remediated with DEC oversight by the Division of Solid and Hazardous Materials and the NYSDOH Bureau of Environmental Radiation Protection.

1.8 Areas of Concern at Sites

(a) A site should be organized into Areas of Concern or "AOCs" as defined in paragraph 1.3(b)1 for purposes of the investigation of the site.

(b) AOCs identified at a site may be further organized into operable units, as defined by paragraph 1.3(b)39 at the request of the remedial party, with DER approval, or by DER.

(c) AOCs may include all current, former and suspected areas of the site associated with the possible contaminant sources identified by this subdivision.

1. Bulk storage tanks and appurtenances, including, without limitation;

    i. tanks and silos;

    ii. rail cars or rail sidings at the site;

    iii. piping, above and below-ground pumping stations, sumps and pits; and

    iv. loading and unloading areas.

2. Storage and staging areas including, without limitation;

    i. storage pads and areas;

    ii. surface impoundments and lagoons;

    iii. waste piles;

    iv. dumpsters; and

    v. chemical storage cabinets or closets.

3. Drainage systems and areas, including, without limitation:

    i. building floor drains and piping, sumps and pits, including trenches and piping from sinks that potentially received process waste;

    ii. roof leaders (when process or storage operations vent to the roof or they are adjacent to air emission points);

iii. drainage swales and culverts;

iv. storm sewer and sanitary collection systems (interior or exterior);

v. storm water detention ponds and fire ponds;

vi. surface water bodies;

vii. septic systems, cesspools and leach fields; and

viii. dry wells and sumps.

4. Discharge and disposal areas, including, without limitation:

i. areas of discharges;

ii. wastewater treatment, collection and disposal systems including without limitation septic systems, seepage pits and dry wells;

iii. landfills;

iv. landfarms;

v. sprayfields;

vi. incinerators;

vii. fill areas, not defined as historic fill in accordance with paragraph 1.3(b)26; and

viii. any discharge regulated by the Underground Injection Control program.

5. Other areas of concern, including, without limitation, areas where the following are or were suspected to have been present:

i. electrical transformers and capacitors;

ii. hazardous materials storage or handling areas;

iii. waste treatment areas;

iv. discolored areas or spill areas;

v. open areas uncharacteristic of the general site cover type away from production operations;

vi. areas with stressed vegetation;

vii. other discharge areas;

viii. compressor vent discharges;

ix. non contact cooling water discharges;

x. areas that may have received flood water or storm water runoff from potentially contaminated areas;

xi. structures; and

xii. any other area suspected of containing contaminants.

(d) Areas of concern may also be associated with other media or resources impacted by contamination resulting from activities at the site or AOCs identified in subdivision (c) above.

1. Groundwater areas of concern may include, without limitation, present or past regulated activities under the New York State Pollutant Discharge Elimination System (SPDES) regulations for discharges to groundwater, including; seepage pits, dry wells, lagoons, and septic systems which may have received unauthorized discharges of waste or other contaminants in contravention of their permitted use.

2. Surface water areas of concern may include, without limitation, any area(s) of a surface water body and associated bottom and floodplain sediment on or proximate to a site, which received or may have received any point or non-point source discharge from the site.

3. Ecological resource AOCS may include, without limitation, areas where ecological resources which have been determined by DEC to constitute an important component of the environment at or in the vicinity of the site may be present. Such AOCs may include, without limitation, all biota and areas of terrestrial, aquatic and marine habitat where contaminants are, have been or are suspected to have been discharged or have migrated.

4. Soil areas of concern may include, without limitation, areas of surface or subsurface soil at a site where:

i. visual evidence of contamination is identified;

ii. distressed vegetation is present; or

iii. previous sampling has indicated contamination at levels or frequencies that exceed applicable SCGs which indicate a need for further evaluation.

1.9 Health and Safety

(a) Health and Safety Plan (HASP). Any person conducting investigation or remediation activities is required to prepare and implement a site-specific health and safety plan which will be adhered to by all personnel involved in the investigation and/or remediation at the site. The HASP is a requirement of the federal Occupational Safety and Health Administration (OSHA) and is not subject to the approval of DER.

1. The plan will be prepared by a qualified person in accordance with the most recently adopted and applicable general industry (29 CFR 1910) and construction (29 CFR 1926) standards of OSHA, the U.S. Department of Labor, as well as any other federal, state or local applicable statutes or regulations.

2. A copy of the health and safety plan (HASP) will be available at the site during the conduct of all activities to which it is applicable.

(b) Community Health and Safety Plan (CAMP). In addition to the HASP for the protection of site workers, all work plans for any intrusive activities must include a site-specific plan, the CAMP, to address community health and safety which identifies measures and/or actions to ensure that the public living and working near the site as well as employees or visitors to any facility located on the site are protected from exposure to site contaminants during intrusive activities, remedial actions or on-site treatment actions undertaken during the investigation and/or remediation of the site, including site management as detailed in subdivision (b) below.

1. At a minimum, a Community Air Monitoring Plan or "CAMP" must include the appropriate requirements identified by the NYSDOH for a site, which are included in Appendix 1A.

2. A fugitive dust/particulate monitoring program is a component of the NYSDOH community air monitoring plan described in paragraph (b)1 above and is necessary for all sites where intrusive activities are planned during the investigation and remediation of the site. Guidance for developing a fugitive dust/particulate monitoring program is included in Appendix 1B.

(c) A HASP, prepared in accordance with OSHA 1910.120, will be required by the site management plan (SMP) prepared in accordance with Chapter 6 as detailed in this subdivision.

1. The SMP, as defined in paragraph 1.3(b)68, will include a HASP and CAMP and be available at the site for use by employees of the remedial party/site owner for activities where the public using the site, surrounding community or the site workers may be exposed to remaining contamination. Such activities associated with the development, redevelopment or use of a site include those:

i. which will expose, excavate or otherwise come in contact with remaining contamination at the site

ii. related to the implementation of the monitoring plan included in the SMP (SMP); and/or

iii. related to the operation, maintenance, removal or decommissioning of any engineering controls.

2. Development of a HASP/CAMP will be required for all contractors engaged in work where the public using the site, surrounding community or the site workers may be exposed to remaining contamination including, but not limited to, activities identified in paragraph 1 above. The HASP/CAMP must:

i. comply with this subdivisions requirements or any site-specific requirements of the site SMP; and

ii. be available at the site to DER or other agencies, site workers, contractor workers and the public during the work period.

3. The CAMP should be in effect whenever:

i. the site cap or soil cover is breached, penetrated or has been temporarily removed from areas of the site;

ii. any potential for exposure to the public or site workers from the remaining contamination may result from activities subject to the SMP; and/or

iii. except as identified in paragraph 4 below, intrusive activities undertaken at a site associated with the implementation of the remedial program which are related to the investigation or delineation of site conditions;

4. A CAMP will not generally be required for the investigation or delineation of site conditions which are not considered intrusive activities for purposes of section 1.9, these activities include the sampling of:

i. surface soil;

ii. groundwater;

iii. surface water;

iv. sediment;

v. ambient or indoor air; and/or

vi. soil gas and sub-slab soil vapor, after the sampling ports have been installed.

5. The HASP/CAMP in the SMP and the requirements imposed on contractors, will be updated as necessary prior to any of the activities identified by this subdivision to reflect any changes to the OSHA requirements or NYSDOH CAMP guidance. These changes will be identified in the periodic review report (PRR) when made or in any notification provided to DER, in accordance with subdivision 1.4(b), which occurs prior to the PRR submission.

1.10 Exemptions from Obtaining NYS and Local Permits and Other Authorizations

(a) The remedial party may be exempted from a requirement to obtain certain permits and other authorizations for site activities issued by the State of New York and local agencies pursuant to DEC statutes, regulations, policies and procedures. An exemption of the obligation to obtain a permit and other authorizations may be provided if all of the criteria below apply to the remedial program being implemented.

1. The activity is on-site. For purposes of this guidance an activity is on-site if:

i. it is conducted on the site; or

ii. it is conducted on different premises that are under common control or are contiguous to or physically connected with the site and the activity manages exclusively contamination for which the remedial party is responsible.

2. The activity satisfies all substantive technical requirements applicable to like activity conducted pursuant to the State or local permit as determined by DEC; and

3. The activity is a component of the remedial program. For purposes of the permit exemptions provided by this section, the construction of a building(s) or other applicable appurtenance on the site is not considered a component of the remedial program.

4. The activity is being conducted pursuant to an oversight document.

(b) Exemptions for permits and other authorizations.

1. DEC permits and other authorizations. An exemption from obtaining permits and other authorizations issued by DEC which meet the criteria in subdivision (a) above will typically be granted.

2. Permits and other authorizations issued by other New York State agencies or authorities. DER will require a remedial party obtain applicable State permits and other authorizations which are not issued by DEC unless there is a demonstration that:

i. obtaining such State or local permit or other authorizations will substantially delay the project or present a hardship, DER may exempt the party from the need to obtain such State or local permits or other authorizations provided:

(1) the remedial program or activity is conducted on the site or on premises that are under common control or are contiguous to or physically connected with the site and the activity manages exclusively contamination which DEC or remedial party is handling as part of the site remedial program;

(2) all substantive technical requirements applicable to like activity conducted pursuant to a permit or other authorizations are complied with, as determined by DEC; and

(3) the activity is a component of a program selected by a process complying with the citizen participation requirements of DER 23 - *Citizen Participation Handbook*, to the extent applicable; or

ii. the substantive nature of the permit or other authorizations criteria are such that

(1) the permit or other authorization has no substantive technical requirements, rather it is only administrative or fee-based;

(2) the substantive requirements are already being complied with by the remedy; or

(3) compliance with the substantive requirements would jeopardize the integrity of the remedy but would not jeopardize the integrity of the infrastructure (e.g., roadways, pipelines, canals) which the permit or other authorization is intended to protect; and

3. Permits or other authorizations issued by local municipalities or agencies. DER will require a remedial party obtain applicable local permits or other authorizations unless there is a demonstration by the remedial party that an exemption is appropriate as set forth in paragraph 2 above.

4. Notwithstanding anything to the contrary in this section, DEC will not waive building or other state or local permits or other authorizations which as a condition of issuance require inspections by the permitting or authorizing agency to confirm compliance with building codes or local ordinances.

5. The remedial party will be responsible for obtaining all permits or other authorizations required for actions associated with the development of the site.

(c) The remedial party must obtain Federal permits or other authorizations required to complete the investigation and/or remediation.

(d) Waiver of registration fees for tanks. For a site that is being remediated under an order or agreement in accordance with paragraphs 1.2(b)1 through 3, the remedial party must ascertain if tanks at the site are regulated under the petroleum bulk storage (PBS) or chemical bulk storage (CBS) regulations. Bulk storage staff in the DEC regional offices or Bulk Storage Section in DER can assist with this determination.

1. If the remedial party determines that the site has tanks regulated under the bulk storage regulations, then the remedial party must ensure the following:

i. the identified tanks must either:

(1) be brought into compliance as active tanks; or
(2) permanently closed in accordance, and in compliance, with the bulk storage regulations;

ii. if the registration qualifies for a waiver of the fee in accordance with 6 NYCRR 375-1.12(e), the remedial party must provide written notification (email is sufficient) to the Bulk Storage Section that the fee for a particular CBS/PBS application is waived; and

iii. the applicant/owner must note on the CBS/PBS application that the fees are waived in accordance with 6 NYCRR 375-1.12(e) by writing "Part 375 Fees exempt" in or near the amount enclosed box on Section A in order for the application to be processed without any fees being required.

2. If the steps given in paragraph 1 above are not followed, the application will be processed as normal. That is, the application will be processed if submitted with fees or rejected if submitted without the fees. Please note that once an application is processed, refunds will not be made.

1.11 Interim Remedial Measures

(a) A priority during investigation and/or remediation is to contain and/or stabilize, to the extent possible, sources of contamination identified in any media to reduce/eliminate receptor exposure to contaminants or to contain further movement of contaminants through any pathway.

1. Actions taken to mitigate environmental or human exposures before the completion of the RI and appropriate remedial alternative selection, are considered interim remedial measures (IRMs).

2. IRMs may include the following activities: removal of source areas, hot spots, wastes and contaminated materials including environmental media; construction of diversion ditches, collection systems, or leachate collection systems; installation of NAPL recovery systems; construction of fences or other barriers; posting of warning signs; installation of water filters or provision of alternative water supplies; installation of sub-slab depressurization systems or soil vapor extraction systems.

3. When the need for an IRM is identified, the remedial party should:

i. immediately notify DER so that the IRM can be performed under DER oversight, as appropriate;

ii. determine whether the IRM is an emergency or non-emergency IRM; and

iii. follow the guidance for the appropriate type of IRM provided in subdivisions (b) or (c) below.

(b) An emergency IRM, as defined in paragraph 1.3(b)15, is to be undertaken pursuant to the *Spill Response Guidance Manual*, or other applicable guidance, as an initial response action.

1. An emergency or time-critical IRM:

i. is not subject to the requirements of this guidance; and

ii. is equivalent to a CERCLA time-critical IRM.

2. IRMs at sites identified by subdivisions1.2(a) or (b), consisting of surface drum removals, construction of fences or other barriers; posting of warning signs, installation of water filters or provision of bottled water will not need to be conducted in accordance with this subdivision.

(c) A non-emergency or non-time critical IRM is an action which may be undertaken at any time during the course of the remedial program, in response to actual or potential environmental or public health exposures identified at the site.

1. The use of a non-emergency IRM is encouraged when a source of contamination or exposure pathway can be effectively addressed before completion of the ongoing investigation and remedy selection process.

2. Non-emergency IRMs:

i. for underground storage tank removals should be conducted in accordance with the requirements of section 5.5 and are not required to comply with paragraph 3 below.

ii. all other non-emergency IRMs should be planned, as appropriate for the level of complexity of the work proposed, in accordance with the guidance for either a remedial design, section 5.2 or remedial action work plan, section 5.3 and implemented in accordance with section 5.4.

3. An IRM construction completion report (CCR) prepared in accordance with the

requirements of subdivision 5.8(b)-(d) should be prepared for each non-emergency IRM undertaken, with the exception of those identified in paragraph (b)2 above. IRMs with no CCR will need to be documented in the FER prepared for the site.

4. Non-emergency IRMs should include the applicable citizen participation requirements for the program under which the IRM is undertaken.

(d) Accelerated remediation is encouraged as an IRM subject to DER approval. IRMs are advanced pursuant to section 1.11 and may be conducted concurrently with sampling to delineate the contamination and to confirm contaminant removal.

1.12 Use of a Site

(a) DER's preference is to achieve a permanent cleanup of a contaminated site, including application of the unrestricted soil SCGs and restoration of groundwater to its classified use, resulting in no future land use restrictions. However, it is realized that achieving this goal is not required by some programs, nor will it always be feasible or practical, in the remedial programs identified in subdivisions 1.2 (a) and (b). Accordingly, the use of a site, or portion of a site, can be either unrestricted use or restricted use as set forth in 6 NYCRR 375-1.8(g).

1. In developing a remedial program for a site the remedial party will:

i. first define the nature and extent of contamination through the RI; and

ii. consider use scenarios set forth in this section in developing a remedy consistent with the remedy selection provisions and limitations for the various remedial programs as set forth in Chapter 4.

2. Unrestricted use. A site designated for unrestricted use is a site subject to no imposed institutional or engineering controls, such as an environmental easement or deed restriction.

3. Restricted use. A site designated for restricted use is a site subject to imposed restrictions on its use, in the form of institutional or engineering controls, to manage exposure to remaining contamination at the site. DER recognizes four categories of restricted land use, from least restrictive to most restrictive as shown below:

i. residential;
ii. restricted residential;
iii. commercial; and
iv. industrial.

Least Restrictive Use
⇕
Most Restrictive Use

(b) Categories of restricted use. The four categories of restricted use detailed in this subdivision require, at a minimum, institutional controls (e.g., environmental easement, deed restriction) in accordance with section 5.6.

1. Residential. The residential use category allows a site to be used for any use(s) other than producing animal products for human consumption. Residential use is the land use category intended for single family housing and requires the fewest restrictions on the use of the site. The residential use

category:

i. does not allow for the use of a SMP or other institutional or engineering controls to manage any remaining soil contamination on the site, although engineering controls without an institutional control, may be used to address:

(1) on-site soil vapor intrusion; or
(2) off-site impacts to other media attributable to site soil; and

ii. allows only two restrictions on the use of the site:

(1) a groundwater use restriction; and/or
(2) a prohibition against producing animal products for human consumption; and

iii. will require an environmental easement or deed restriction, except when the remedial program achieves the residential use soil cleanup objectives (SCOs) set forth at 6 NYCRR 375-6.8 to a depth of fifteen feet below the developed ground surface or to bedrock, if shallower. This will only apply, where DER determines that the:

(1) protection of ecological resources SCOs are not applicable;
(2) groundwater beneath the site is not contaminated above standards, or if there is a groundwater concern, there is a municipal prohibition on the extraction of groundwater for potable purposes; and
(3) property will not be used for producing animal products for human consumption, either by:
(A) an existing restriction on such use; or
(B) by the site's location in an area which precludes such use.

2. Restricted residential. The restricted residential use category allows a site to be used for residential use but only when there is common ownership or control by a single owner/managing entity of the site. Restricted residential use is the land use category intended for apartments, condominium, co-operative or other multi-family/common property control residential development. The restricted residential use category:

i. requires, in addition to the restrictions in 1.ii above, at a minimum the following additional restrictions on the use of the site:

(1) a prohibition on vegetable gardens on the site, unless planted in gardens where the soil achieves the residential use soil cleanup objectives; and
(2) a prohibition of single-family housing;

ii. requires a SMP to manage remaining contamination and institutional/ engineering controls at the site;

iii. is the appropriate use category for the following site uses:

(1) day care or other child care facilities;
(2) elementary or secondary schools; or

(3) college or boarding school residential buildings; and

iv. allows for active recreational uses, which includes recreational activities with a reasonable potential for soil contact, such as:

(1) designated picnic areas;
(2) playgrounds; or
(3) natural grass sports playing fields, including surrounding unpaved spectator areas.

3. Commercial. The commercial use category anticipates use by businesses with the primary purpose of buying, selling or trading of merchandise or services. The commercial use category:

i. restricts the use to commercial activities including the buying and/or selling of goods or services, or other uses identified in subparagraph iii below;

ii. requires a SMP to manage remaining soil contamination and institutional/ engineering controls at the site;

iii. is the appropriate use category for the following site uses:

(1) health care facilities, including hospitals, clinics etc.; or
(2) college academic and administrative facilities; and

iv. allows for passive recreational, which includes recreational uses with limited potential for soil contact, such as:

(1) artificial surface fields;
(2) outdoor tennis or basketball courts;
(3) other paved recreational facilities used for roller hockey, roller skating, shuffle board, etc.;
(4) outdoor pools;
(5) indoor sports or recreational facilities;
(6) golf courses; and
(7) paved (raised) bike or walking paths.

4. Industrial. The industrial use category anticipates use for the primary purpose of manufacturing, production, fabrication or assembly processes and ancillary services. The industrial use category:

i. allows the use of the site only for industrial purposes with access to the site limited to workers or occasional visitors;

ii. includes all of the restrictions set forth in subparagraph 2.i, above; and

iii. requires a SMP to manage remaining soil contamination and institutional/engineering controls at the site.

(c) Land-use exposure assessment. Site use categories are based on use-based exposure assessments to soil that will remain at a site and were developed pursuant to ECL 27-1415(6)(b). These exposure assessments were developed using a number of exposure scenarios which evaluated various receptors, all of which are presented and discussed in detail in the Technical Support Document as defined at 6 NYCRR 375-6.2(b). The use-based soil cleanup objectives (SCOs) for the protection of public health were developed based upon these scenarios. A summary of the receptors and pathways considered in these exposure scenarios, which are the basis of the protection of human health soil cleanup objectives for each of the unrestricted and restricted use categories set forth in subdivisions (a) and (b) above, are summarized in Table 1.12 below.

Table 1.12 Exposure Scenario Receptors and Pathways Used as the Basis for the Development of the Protection of Public Health SCOs

Use Category	Unrestricted	Residential	Restricted Residential	Commercial	Industrial
Exposed Person →	*Adult & Child*	*Adult & Child*	*Adult & Child*	*Adult & Child*	*Adult & Adolescent*
Route of Exposure ↓					
Incidental Soil Ingestion	✔	✔	✔	✔	✔
Inhalation of Soil	✔	✔	✔	✔	✔
Dermal Contact with Soil	✔	✔	✔	✔	✔
Homegrown Vegetable Consumption	✔	✔			
Producing animal products for human consumption	✔				
Groundwater Protection	✔	Consider per 375-6.5	Consider per 375-6.5	Consider per 375-6.5	Consider per 375-6.5
Ecological Resource Protection	✔	Consider per 375-6.6	Consider per 375-6.6	Consider per 375-6.6	Consider per 375-6.6

1. A check mark in the box indicates the person considered (e.g., child, adult) by category and route of exposure were included in the evaluation to determine the SCO for each use category. For example, the restricted residential exposure does not have the boxes for “Homegrown Vegetable Consumption” or “Raising of Livestock” checked, accordingly these activities are not allowed in the restricted categories.

2. When groundwater or ecological resources are impacted by soil contamination at a site, the SCOs for the protection of groundwater or ecological resources will apply, respectively per 6 NYCRR 375-6.5 or 6 NYCRR 375-6.6. Since the unrestricted use SCO already has accounted for both protection of groundwater and ecological resources, the box is checked and there is no need to consider their applicability.

1.13 Standards, Criteria and Guidance

(a) Applicability. The standards, criteria and guidance (SCGs) discussed in this section are intended to apply to the remedial program, unless good cause exists why conformity with particular SCGs should be dispensed with.

1. An index to potentially applicable New York State SCGs is provided on DEC's website identified in the table of contents, which lists some of the SCGs potentially applicable to site investigation and remediation activities conducted in New York State. This list is neither meant to be comprehensive nor to imply that all of the listed SCGs are appropriate for every investigation or remediation conducted.

2. The remedial party must also comply with other federal and local SCGs, if applicable to the site, which are also identified on the website SCG page.

(b) SCG description. SCGs as defined at paragraph 1.3(b) 71, are promulgated requirements and non-promulgated guidance which guide site activities during investigation and remediation.

1. Standards and criteria are set forth in Federal or New York State law. They are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations which are generally applicable, consistently applied and officially promulgated under federal or State law that are either directly applicable or relevant and appropriate to a contaminant, remedial action, location, or other circumstance.

2. Guidance includes non-promulgated criteria which should be considered, for investigation and/or remediation.

1.14 Sustainability and Green Remediation

(a) Role of green remediation in remedial programs. Green remediation seeks to minimize ancillary environmental impacts such as green house gas emissions (GHGs) from remedial programs. Applying green remediation concepts, such as minimizing energy consumption, maximizing the reuse of land and the recycling of materials, and conserving natural resources helps to achieve that objective.

1. Green remediation concepts will be applied to the cleanup of contaminated properties such that the remedies are protective of public health and the environment, economically sound, and as sustainable as possible.

2. Green remediation is not intended to encourage, and does not justify, implementation of a "no action" or lesser remedy when a more comprehensive remedy is called for, appropriate, and feasible.

3. Consistent with existing laws and regulations, consideration of green remediation

concepts will be expected and encouraged in all phases of the remedial program. These efforts will provide for a more sustainable cleanup by:

i. reducing direct and indirect emissions of carbon dioxide (CO2) and other GHGs;

ii. conserving natural resources;

iii. reducing waste; and

iv. maximizing habitat value.

(b) Role of sustainability in remedial programs. Opportunities to increase sustainability exist throughout the investigation, design, construction and site management phases of site remediation regardless of the selected cleanup remedy.

1. DER will emphasize and encourage the use of green strategies and approaches at every stage of the remedial program by remedial parties and will also foster the use of green remediation best management practices as they are identified by DEC.

2. While sustainability will be a consideration in remedy selection, it will not change any existing statute, regulation or guidance.

(c) Additional guidance relative to green remediation and sustainability in DER remedial programs is available on DEC's website identified in the table of contents.

Section 1.15 Electronic Submissions

(a) DER supports and encourages the use of electronic submissions by the remedial party to the greatest degree appropriate for the site-specific remedial program. The electronic submission approach for a given activity may vary and should be defined in the appropriate work plan or by consultation with the DER project manager.

1. The remedial party will deliver to the DER preliminary or final reports in an electronic format that complies with DEC's Electronic Document Standards (EDS) or as otherwise directed by DER.

2. All data generated will be submitted in an electronic data deliverable (EDD) that complies with the DEC's Electronic Data Warehouse Standards (EDWS) or as otherwise directed by DER.

3. Additional information relative to the EDS, EDD and EDWS is available on the DEC website identified in the table of contents.

(b) DER will also seek to maximize its use of electronic responses and document distributions in all reviews, approvals or other DER initiated actions required in accordance with this guidance.

This Page Intentionally Left Blank

CHAPTER 2 SAMPLING, ANALYSIS and QUALITY ASSURANCE

2.1 Sampling and Analysis Requirements

(a) Selection of analytical parameters.

1. All initial investigations must analyze and report on:

i. for organic contaminants the full target compound list plus the 30 (10 volatile organic compounds and 20 semi-volatile organic compounds) highest concentration tentatively identified compounds (TICs). The full target compound list plus the 30 (TCL+30), as defined in paragraph 2.4(d)15; and

ii. for inorganic compounds, the full target analyte list (TAL), as defined in paragraph 2.4(d)13.

2. Samples from an area of concern or a site may be analyzed for a limited contaminant list as approved by DER once the nature of the contamination is fully characterized.

3. For investigations of known petroleum releases, sample analysis must be for the suite of contaminants shown in the fuel oil and gasoline tables (tables 2 and 3) contained in the Commissioner Policy on *Soil Cleanup Guidance* (CP-Soil).

4. For investigation of non-petroleum storage and discharge areas, sample analysis must use the methods appropriate for the stored or discharged material.

5. Analysis must be conducted by a laboratory that is accredited pursuant to the NYSDOH Environmental Laboratory Accreditation Program (ELAP) for the category of parameters analyzed.

(b) Laboratory analytical methods. Except as provided in paragraph 1 below, samples collected by the remedial party will be analyzed by an analytical method included in the most current DEC Analytical Services Protocol (ASP), available on DEC's website identified in the table of contents.

1. An alternative to the ASP may be proposed if an analytical method, as described in the most current ASP:

i. does not exist for a specific contaminant or parameter (e.g., pH, dissolved oxygen) within a specific matrix;

ii. is demonstrated to be inappropriate for the matrix analyzed; or

iii. cannot achieve an acceptable detection limit or minimum reporting limit as provided in a DER-approved work plan.

2. Where one of the exceptions in paragraph 1 exists, the remedial party will:

i. select an appropriate method from another source;

ii. document the rationale for selecting the method;

iii. develop a standard operating procedure for the method, including a quality control section; and

iv. propose the method and standard operating procedure for such method to DEC for its consideration and approval.

3. The method selected must achieve a detection limit or minimum reporting limit that is below the applicable cleanup level for all contaminants that may be present in the medium being sampled and analyzed.

4. Unless otherwise provided in a DER-approved work plan, the Lloyd Kahn method must be used for the determination of total organic carbon in soil and sediment. This method is available on DEC's website identified in the table of contents.

5. Except for tissue samples (see subdivision 2.1 (d) below), gas chromatography methods with a mass spectrometer detector system must be used for analysis of semi-volatile contaminants (exclusive of herbicides, pesticides and PCBs). Other chromatography methods (e.g., high-performance liquid chromatography) with appropriate detector systems must be used for the analysis of organic analytes amenable only to non-gas chromatographic methods. A mass spectrometer detector system is preferable but not required if the site has already been characterized to the extent that all contaminants are known.

6. The procedures (including quality control and quality assurance) specified in the ASP analytical method must be followed unless an alternate procedure is included in the approved work plan.

(c) Field-testing technologies and methods.

1. DER accepts the use of field-testing technologies (e.g., immunoassay test kits, x-ray fluorescence devices, direct-sensing down-hole tools) when supported by ELAP approved analytical methods, provided the data are not used to make final determinations relative to impacts of contamination on public health. The role of field testing technologies for programs for which this guidance applies is described in Appendix 2A.

2. Field-testing technologies are encouraged in the following circumstances:

i. for contaminant delineation if contaminant identity is known or if there is reasonable certainty that a specific contaminant may be present (e.g., benzene, toluene, ethyl benzene, xylene in the case of sampling for a gasoline release);

ii. to bias sample location to the specific location of greatest suspected contamination;

iii. for testing or analysis of intermediate samples;

iv. to collect data in support of engineering design or remedy optimization; or

v. for segregating wastes for off-site disposal or treatment.

3. Where a field-testing technology is proposed to be used:

i. a standard operating procedure must be provided for DER approval that includes:

(1) a detailed step-by-step procedure for the analysis method;
(2) qualifications of the technician responsible for performing the field testing; and
(3) quality assurance procedures (e.g., calibration standards, blanks) as specified by the method;

ii. laboratory analysis of split samples must be performed to evaluate the correlation between the field testing technology and the ELAP-certified laboratory results. A minimum of 10% of the samples must be analyzed by the ELAP-certified laboratory using a standard ASP method. In general, sufficient correlation occurs if the field testing and laboratory results are within 30 relative percent difference;

iii. 10% of sample analyses using the field-testing technology must be performed in duplicate;

iv. there should be no bias in the selection of duplicate or correlation samples, such as selecting only positive detections for duplicate or correlation sampling. The duplicate or correlation analysis should be done on every tenth sample, selected in the order they are collected and presented for analysis; and

v. the field testing must be performed by a field technician with the following minimum qualifications:

(1) completion of a certification course or training by an experienced technician who has demonstrated proficiency in the method; or
(2) demonstration of proficiency by correlation of the technician's field-testing technology results with fixed laboratory analysis results collected from a previous site.

(d) Tissue analysis. Where the analysis of tissue samples is required, the sampling and analysis included in any work plan must be in accordance with this subdivision.

1. For tissue analysis. Methods and sampling plans must be specified in the work plan and approved prior to implementation. EPA SW-846 methods are not appropriate for biological tissue as these methods, for example, often underestimate PCB/organochlorine concentrations.

2. Analysis of lipid content is required for all organochlorine compounds using EPA3540C Soxhlet extraction with 1:1 hexane/acetone ratio or other approved method. The percent lipids should be determined from the same aliquot as that used to determine the organochlorine concentration.

3. Tissue sampling should follow the current procedures set forth in the most current DEC guidance documents for biota collection, preparation and analysis.

(e) Soil vapor intrusion sampling. When soil vapor, sub-slab vapor, crawl space air, indoor air or outdoor air sampling is required the NYSDOH document, *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006) or the most current version with appropriate updates, must be

used.

(f) Determination of the presence of non-aqueous-phase liquid (NAPL).

1. Methods acceptable to DER must be used to determine the presence of NAPL in soil or water. Such methods include, without limitation, visual identification of sheens or other visible product, measurable thickness of product on the water table, the use of field instruments, ultraviolet fluorescence, soil-water agitation, centrifuging and hydrophobic dye testing.

2. NAPL is suspected to be present in groundwater where:

i. concentration is equal to or greater than 1% of the water solubility of the contaminant; or

ii. a mixture of such contaminants in (i) above is present, then the effective water solubility of the contaminant should be estimated for this determination.

3. NAPL is suspected to be present in soil where a single contaminant is present at concentrations greater than 10,000 mg/kg.

(g) Alteration of groundwater samples collected for metals analysis.

1. Provision for the alteration of groundwater samples (filtration as defined in section 2.4) for metals analysis is only acceptable when the rationale for any proposed filtration is prepared in accordance with this subdivision and, if a field decision, must be reviewed and approved in accordance with subdivision 1.6(d) by the DER project manager prior to any filtration of samples.

2. Alteration of groundwater samples will not be approved unless the following conditions can be documented:

i. the target turbidity level of 50 NTUs for development and sampling of groundwater monitoring well is or will be exceeded;

ii. the well(s) being sampled was (were) properly designed, installed, constructed, developed, maintained and sampled;

iii. attempts have been made to repurge and/or redevelop the well; and

iv. replacement of the well(s) with documentation of proper well construction and installation where necessary, has been considered and is not justified.

3. Any request to filter groundwater samples must include a justification which addresses the conditions listed in paragraph 2 above and include a filtering protocol which:

i. is consistent with the methods in the November 1986 Environmental Protection Agency document entitled Test Methods for Evaluating Solid Waste (EPA-SW846);

ii. is a filtration methodology which minimizes changes in the water chemistry of the sample;

iii. provides that any precipitates which may form upon removal of the sample from the well (e.g., iron floc) must not be filtered out but dissolved by acid/preservation; and

iv. provides that a filtered sample would not be collected without an accompanying unfiltered sample.

4. When collecting filtered groundwater samples:

i. the sample must be collected using a minimally disturbing method (e.g., low-rate bladder or peristaltic pumping, bailing);

ii. the turbidity of the samples must be recorded at the time of collection;

iii. two samples must be collected:

(1) one of which must be preserved immediately in an unaltered state; and
(2) the second must be filtered and preserved; and

iv. if split samples are required, then both the filtered and unfiltered samples must be split.

5. When analyzing the samples:

i. if the unfiltered sample does not exceed SCGs, there is no need to analyze the filtered sample; and

ii. if there is a question whether metal contaminants are naturally occurring or were introduced through human-made activities, upgradient and background wells may be sampled using the same procedure, with best efforts made to obtain an uncontaminated sample of the horizon which is being screened, to allow a comparison of contaminant data to naturally occurring metal ion concentrations in the aquifer matrix.

2.2 Reporting Requirements

(a) Unless otherwise approved in advance by DER, laboratory data deliverables must be as defined in this subdivision.

1. Category B laboratory data deliverables. Category B data deliverables which are defined in the ASP and summarized in Appendix 2B:

i. must be submitted for the following types of samples, except for sites subject to section 5.5 (UST closure):

(1) samples representing the final delineation of the nature and extent of contamination for a SC or RI completed pursuant to Chapter 3;
(2) correlation samples as defined in section 2.4;
(3) confirmation and documentation samples as defined in paragraphs 1.3(b)3 and 11 and collected pursuant to section 5.4; and/or

(4) samples to determine closure of a system pursuant to sections 6.4 and/or 6.5; and

ii. must include the preparation of a Data Usability Summary Report (DUSR) prepared by a party independent from the laboratory performing the analysis for all samples when Category B data deliverables are provided. This party must also be independent from any direct involvement with the project, e.g. Project Manager or property owner. The required content of a DUSR and qualifications for the person preparing the DUSR are detailed in Appendix 2B.

2. Category A and Category Spills laboratory data deliverables. Category A or Category Spills data deliverables, which are defined in the ASP and summarized in Appendix 2B must be submitted for all analyses not identified in paragraph 1 above.

3. Analytical cleanup. Any analytical cleanup methods required must be:

i. in accordance with subdivision 2.3(c);

ii. identified in the work plan; and

iii. if employed, identified in the data deliverable package.

4. Tentatively identified compounds (TICs). TICs identified by the analysis of a sample in accordance with subparagraph 2.1(a)1.ii must be reported in the data deliverables in the following cases:

i. all samples analyzed as part of a SC, RI or pre-design sampling effort undertaken to delineate the nature and extent of contamination;

ii. all samples in all phases of a project when (a) TIC(s) has/have been identified as a contaminant of concern; or

iii. if TICs are present and included on the discharge limits for a treatment system.

(b) Submission of data. Final/validated analytical data, with applicable data qualifiers are to be summarized in tables for all reports prepared in accordance with this guidance.

1. When reporting analytical results below the method detection limit (MDL) or method reporting limit (MRL), the result will be shown as non-detect (ND) along with the appropriate MDL or MRL.

2. The data from individual samples, QA information (e.g., chromatograms) and other supporting documentation identified by this section are not to be included in appendices or otherwise included in the reports or work plans. This information and other supporting data identified in subdivision 3.13(c) are to be included in a separate electronic data submission provided at the time of the submission of the report/work plan.

(c) Electronic submissions. All required documentation identified by this Chapter must be provided in an electronic format in accordance with section 1.15.

2.3 Quality Assurance Requirements

(a) The remedial party must ensure that suitable and verifiable data result from sampling and analysis. To achieve this objective the quality assurance procedures detailed in this section must be followed for all sampling and laboratory analysis activities.

1. Determination of need for a quality assurance officer (QAO). The remedial party shall consult with DER during the development of the work plan, pursuant to section 3.3, to determine whether a QAO will be required. A QAO will generally be necessary for large or complex projects, such as those requiring non-routine analytical methods or sampling techniques (e.g., field testing technologies).

2. Role of the QAO. Where required, the QAO:

i. will review sampling procedures and certify that the data was collected and analyzed using the appropriate procedures;

ii. shall not be directly involved in the collection and analysis of samples from the site for which they are the QAO.; and

iii. acts in conjunction with the project manager in the development of the sampling and analytical portion of a site-specific quality assurance project plan (QAPP);

3. QAO qualifications. The QAO:

i. must not have another position on the project, such as a project or task manager, that involves project productivity or profitability as a job performance criteria;

ii. must, at a minimum, hold a bachelors degree:

(1) in a relevant natural or physical science; or
(2) engineering; and

iii. must be familiar with analytical methods, data interpretation and validation, the development of sampling plans, quality control procedures and auditing requirements and techniques.

3. As required by the approved work plan, during the course of the sampling and analytical portion of the project the QAO or a designee may:

i. conduct periodic field and sampling audits;

ii. interface with the analytical laboratory to resolve problems; and

iii. interface with the data validator and/or the preparer of the DUSR to resolve problems.

(b) Data acceptance.

1. DER will reject analytical data from any laboratory which does not have a current and

appropriate certification for the parameters analyzed.

2. Laboratories performing the analysis of tissue samples must provide documentation of the demonstration of capability (e.g., analysis of reference samples) for approval by DER prior to conducting any tissue analysis.

3. DER may reject data that do not meet the data quality objectives (e.g., if minimum reporting limits specified in the approved work plan are not achieved, if the pressure in an air canister is outside of the acceptable ranges, if holding times or temperature ranges are not met, etc.).

(c) Specific sampling and analytical requirements.

1. Laboratories will follow all quality assurance/quality control procedures specified in the approved analytical methods.

2. Sampling methods, sample preservation requirements, sample holding times, decontamination procedure for field equipment and frequency for field blanks, field duplicates and trip blanks for aqueous samples should conform to the ASP, unless an alternate method/procedure has been approved in the work plan. Duplicate and matrix/matrix-spike duplicates are required at a frequency of 1 per 20 samples. Aqueous trip blanks are required at the same frequency for samples that are to be analyzed for volatiles. Field and/or rinsate blanks may also be required at the same frequency.

3. Sample matrix cleanup. Sample matrix cleanup (in laboratory) must occur when chemical interferences may be causing elevated reporting limits or inadequate contaminant identification or quantitation. Sample matrix cleanup must conform to the procedures specified in the ASP.

4. Results from analysis of soils and sediments will be reported on a dry-weight basis, except for those results required by the method to be otherwise reported. Analysis of vegetation tissue shall be on a dry-weight basis. All other tissue analysis shall be reported on a wet-weight basis.

5. Samples must be sent to the laboratory as soon as practicable. Generally, samples should be received by the laboratory within 48 hours of sampling.

(d) Soil vapor or air sampling and analysis. Where soil vapor, sub-slab vapor, crawl space air, indoor air or outdoor air sampling is required, the work plan is to be prepared using the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006) or the most current version must be used.

(e) A glossary of quality assurance terms is provided in subdivision 2.4(d).

2.4 Quality Assurance Project Plan

(a) All work plans must include quality assurance procedures to be followed for sampling and analysis. All work plans and the QAPP, undertaken pursuant to an oversight document in accordance with subdivision 1.2(d), must be submitted and approved in advance of sampling.

1. These procedures will be incorporated into the work plan or be supplied as a separate stand alone document. If a separate QAPP is submitted, a summary of the sample information identified in subparagraph 2.v below must also be included in the work plan.

2. The following should be included in either the work plan QAPP section or a standalone QAPP:

i. the project scope and project goals as well as how the project relates to the overall site investigation or remediation strategy;

ii. project organization, including the designation of a project manager, QAO and field analyst, (if field analysis is planned). Resumes of these individuals must be included;

iii. sampling procedures, data quality usability objectives and equipment decontamination procedures;

iv. site map showing sample locations;

v. an "Analytical Methods/Quality Assurance Summary Table" which must include the following information for all environmental, performance evaluation and quality control samples:

(1) matrix type;
(2) number or frequency of samples to be collected per matrix;
(3) number of field and trip blanks per matrix;
(4) analytical parameters to be measured per matrix;
(5) analytical methods to be used per matrix with minimum reporting requirements;
(6) number and type of matrix spike and matrix spike duplicate samples to be collected;
(7) number and type of duplicate samples to be collected;
(8) sample preservation to be used per analytical method and sample matrix;
(9) sample container volume and type to be used per analytical method and sample matrix; and
(10) sample holding time to be used per analytical method and sample matrix; and

vi. a detailed description of sampling methods to be used and sample storage in the field.

(b) If tissue samples are being collected, the QAPP for tissue analysis should follow the outline in the USEPA publication *Preparation Aids for the Development of Category I Quality Assurance Project Plans* (EPA/600/8-91/003).

(c) Analytical data must be provided in an electronic format in accordance with section 1.15.

(d) Quality assurance glossary. Quality assurance terms and definitions presented in this subdivision must be used in preparing all documents related to quality assurance or control.

1. "Alteration" means altering a sample collected for analysis in any way other than by adding a preservative, such as nitric acid to lower pH. Examples of alteration include, but are not limited to: filtering, settling and decanting, centrifuging and decanting and acid extracting.

2. “Analytical Services Protocol” or "ASP" means DEC’s compilation of approved EPA laboratory methods for sample preparation, analysis and data handling procedures.

3. “Correlation sample” means a sample taken, when using a field-testing technology, to be analyzed by an ELAP-certified laboratory to determine the correlation between the laboratory and field analytical results.

4. "Effective solubility" means the theoretical aqueous solubility of an organic constituent in groundwater that is in chemical equilibrium with a separate-phase (NAPL) mixed product (product containing several organic chemicals). The effective solubility of a particular organic chemical can be estimated by multiplying its mole fraction in the product mixture by its pure-phase solubility.

5. “Environmental Laboratory Accreditation Program” or “ELAP” means a program conducted by the NYSDOH which certifies environmental laboratories through on-site inspections and evaluation of principles of credentials and proficiency testing. Information regarding ELAP is available at the NYSDOH Wadsworth Laboratory website .

6. "Filtration" means the filtering of a groundwater or surface water sample, collected for metals analysis, at the time of collection and prior to preservation. Filtering includes but is not limited to the use of any membrane, fabric, paper or other filter medium, irrespective of pore size, to remove particulates from suspension.

7. “Final delineation sample” means a sample taken to make a decision regarding the extent of contamination at a site during the investigation and the design of the remedy or confirmation/documentation sampling during remedial construction, which is to be analyzed by an ELAP-certified laboratory.

8. “Intermediate sample” means a sample taken during the investigation or remediation process that will be followed by another sampling event to confirm that remediation was successful or to confirm that the extent of contamination has been defined to below a level of concern.

9. "Method detection limit" or "MDL" means the minimum concentration of a substance that can be measured and reported with a 99 percent confidence that the analyte concentration is greater than zero and is determined from the analysis of a sample in a given matrix containing the analyte.

10. “Minimum reporting limit” means the lowest concentration at which an analyte can be detected and which can be reported with a reasonable degree of accuracy. It is the lowest concentration that can be measured, a lab-specific number, developed from minimum detection limits, and is also referred to as the practical quantitation limit (PQL).

11. “Nephelometric Turbidity Unit” or "NTU" is the unit by which turbidity in a sample is measured.

12. "Preservation" means preventing the degradation of a sample due to precipitation, biological action, or other physical/chemical processes between the time of sample collection and analysis. The most common examples involve refrigeration at 4 degrees Celsius and lowering sample pH by the addition of acid to keep dissolved metals in solution or to reduce the biodegradation of dissolved organic analytes.

13. "Target analyte list" or "TAL" means the list of inorganic compounds/elements designated for analysis as contained in the version of the *EPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration* in effect as of the date on which the laboratory is performing the analysis. For the purpose of this chapter, a Target Analyte List scan means the analysis of a sample for Target Analyte List compounds/elements.

14. "Targeted compound" means a contaminant for which a specific analytical method is designed to detect that potential contaminant both qualitatively and quantitatively.

15. "Target compound list plus 30" or "TCL+30" means the list of organic compounds designated for analysis (TCL) as contained in the version of the EPA *Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration* in effect as of the date on which the laboratory is performing the analysis, and up to 30 non-targeted organic compounds (plus 30) as detected by gas chromatography/mass spectroscopy (GC/MS) analysis.

16. "Tentatively identified compound or TIC" means a chemical compound that is not on the target compound list but is detected in a sample analyzed by a GC/MS analytical method. TICs are only possible with methods using mass spectrometry as the detection technique. The compound is tentatively identified using a mass spectral instrumental electronic library search and the concentration of the compound estimated.

17. "Well development" means the application of energy to a newly installed well to establish a good hydraulic connection between the well and the surrounding formation. During development, fine-grained formation material that may have infiltrated the sand pack and/or well during installation is removed, allowing water from the formation to enter the well without becoming turbid and unrepresentative of groundwater in the formation.

This Page Intentionally Left Blank

CHAPTER 3 SITE CHARACTERIZATION and REMEDIAL INVESTIGATION

3.1 Site Characterization and Remedial Investigation Overview

(a) Site Characterization. This chapter sets forth guidance for characterization of a site, pursuant to an oversight document identified in paragraph 1.2(d). The remedial program for a site requiring a site characterization (SC) is completed in the steps detailed in this chapter, beginning with the site characterization and concluding, where necessary, with a remedial investigation (RI).

1. The SC is designed to determine whether a site poses little or no threat to public health and the environment or if it poses a threat and whether the threat requires further investigation. The SC gathers the information necessary to characterize whether site-related contamination requires further action pursuant to one of the DER remedial programs identified in section 1.2. The SC is a defined activity for a SSF site. The SC is not generally performed for sites in the ERP, BCP or VCP, with the exception of manufactured gas plant sites, provided however, that the need for a SC may be identified by DER or the remedial party in any program.

2. A SC requires a records search followed, if needed, by field characterization. The purpose of a SC is to identify potentially contaminated areas at a site. It includes the gathering of sufficient information to determine whether the site requires further investigation or remediation. The steps in the SC process are:

i. a records search, conducted in accordance with Appendix 3A; and

ii. to the extent necessary, a field characterization. If field work is necessary, a work plan, developed in accordance with section 3.3, will be implemented and a site characterization report (SCR), prepared in accordance with section 3.13, will be completed and submitted to DER.

3. For those programs requiring a SC, based upon a review of the SCR, DER will:

i. find that no further action is required at the site, where DER determines:

(1) no contaminated areas of concern were discovered; or
(2) that any contamination identified would not require further investigation or remediation;

ii. require a RI, pursuant to this chapter, where DER determines contamination is present at levels and to an extent that warrants further delineation of the nature and extent of the contamination to support selection of a remedy; or

iii. determine that no further RI is required, as sufficient information exists to make a decision regarding remediation for the site. This would occur where the nature and extent of contamination was sufficiently defined to determine an appropriate IRM or to initiate the remedy selection process.

4. If at any time contamination is identified at levels that indicate the need for a RI, prior to the completion of the SC, in accordance with subdivisions (b) and (c) below, the SC may be discontinued and the data and a RI work plan submitted as set forth in subdivision 3.13(b). The SC will be discontinued:

i. at DER's direction; or

ii. with DER approval of a request from the remedial party.

5. Site characterization (SC). A SC investigation is intended to determine whether any of the conditions identified by this subdivision can be attributed to disposal in an area of concern (AOC) on the site identified by the site records search and if the site is a contaminated site requiring further investigation and remediation.

(b) Evaluation of data relative to standards, criteria or guidance (SCGs),. The presence of contaminants in any environmental media can be compared to applicable SCGs) for the environmental media which may be present on the site.

1. At sites where soil contaminant concentrations are equal to or below unrestricted SCGs no action or study is warranted because of soil contamination.

2. At sites where contaminants in any medium are above unrestricted SCGs, the remedial party and DER must consider whether the contaminants presence at the site are:

i. attributable to the release or disposal of a hazardous waste (or petroleum, if applicable to the program) disposal on the site; and

ii. present, at levels and/or at a frequency in the samples collected from the site, sufficient for DER to require a further delineation of the nature and extent of the contamination in a RI, as set forth in paragraph 2 below.

3. Evaluation of soil contamination for the protection of public health. At sites where soil contaminant concentrations are identified above the unrestricted soil SCGs, the remedial party should consider the soil SCGs based upon the protection of public health set forth in CP Soil. When evaluating these SCGs:

i. no action or study is warranted because of soil contamination where contaminant concentrations are equal to or below applicable protection of public health SCOs; or

ii. if one or more applicable SCOs for the protection of public health are exceeded, this alone does not trigger the need for remedial action or define ”unacceptable“ levels of contaminants in soil. In assessing the need for further investigation or other action, DER will also consider that:

(1) soil SCOs are applicable statewide and do not account for many site-specific considerations which could potentially result in higher levels (e.g. site-specific background conditions);

(2) concentrations of contaminants which are higher than the soil SCGs for the current, future or reasonably anticipated future use of the site are not necessarily a health or environmental concern;

(3) should a soil SCG for the current, future or reasonably anticipated future use of the site be exceeded, the degree of public health and environmental concern depends on several factors, including:

(A) the magnitude by which the concentration exceeds the SCG;

(B) the accuracy of the exposure assessments;

(C) other sources of exposure to the chemical; and

(D) the strength and quality of the available toxicological information on the chemical; and

(E) the level of concern associated with SCO concentrations for the current, future or reasonably anticipated future use of the site depends on the likelihood of exposure to soil contamination at levels of potential concern to public health or to ecological receptors.

4. Evaluation of soil contamination for the protection of groundwater. At sites where soil contaminant concentrations are identified above the unrestricted soil SCGs and there are impacts to groundwater above the applicable groundwater SCGs, the remedial party should consider the soil SCGs based upon the protection of groundwater set forth in CP Soil. When evaluating groundwater protection soil SCGs:

i. no action or study is warranted because of soil contaminations impact on groundwater, where contaminant concentrations are equal to or below applicable protection of ground water SCOs; or

ii. if one or more applicable soil SCGs for the protection of public health are exceeded, this alone does not trigger the need for remedial action or define ”unacceptable“ levels of contaminants in soil. In assessing the need for further investigation or other action DER will also consider the items set forth in subparagraph 3.ii above.

5. Evaluation of soil contamination for the protection of ecological resources. At sites where soil contaminant concentrations are identified above the unrestricted soil SCGs and an ecological resource is identified, the remedial party should consider the soil SCGs based upon the protection of ecological resources set forth in CP Soil. When evaluating ecological resources protection soil SCGs:

i. no action or study is warranted because of soil contaminations impact on an ecological resource, where contaminant concentrations are equal to or below applicable protection of ecological resources SCGs; or

ii. if one or more applicable soil SCGs for the protection of public health are exceeded, this alone does not trigger the need for remedial action or define ”unacceptable“ levels of contaminants in soil. In assessing the need for further investigation or other action, DER will also consider the items set forth in subparagraph 3.ii above.

6. Surface water and wetlands. If a surface water body or wetland is present on the site, or sediments are present on a site where disposal may have occurred and contaminant concentrations are identified above the applicable surface water or sediment SCGs, DER will consider the items set forth in subparagraph 2.ii above in assessing the need for further investigation or other action.

7. In addition to the factors detailed in paragraph 1 above, if one of the following is determined to be attributable to the site by the SC, the need for a RI should also be evaluated:

i. the potential for an adverse impact to fish and wildlife resources exists, as determined by subsection 3.10.1 and Appendix 3C;

ii. a public health exposure pathway was identified or potentially exists, as determined by Appendix 3B;

iii. the identified contamination emanates beyond the property boundary of the site being characterized, at levels and/or at a frequency in the samples collected from the site, at levels and/or at frequencies sufficient for DER to require a further delineation of the nature and extent of the contamination, as discussed in paragraph 2 above; or

iv. hazardous waste has been disposed which DER has determined represents a significant threat to public health and the environment.

8. After appropriate investigation of a site subject to an oversight agreement as set forth in subdivision 1.2(d), DER may conclude that the SC supports a no further action determination and further investigation is not warranted, when:

i. contaminants identified in media at the site do not exceed the applicable soil SCG, the groundwater standard or another SCG applicable to the site;

ii. the SCGs for the current, future or reasonably anticipated future use of the site are exceeded however the levels remain protective;

iii. none of the conditions identified in paragraphs 2 through 6 above were identified; or

iv. contamination cannot be confirmed as having occurred at the site based on disposal in an area of concern identified by the records search cannot be confirmed as existing at the site.

(c) Remedial investigation. A RI is necessary where data indicates disposal of contaminants at the site has occurred and contamination is potentially present at levels and/or at frequencies sufficient for DER to require a full delineation of the nature and extent of the contamination, to allow a decision by DER regarding any necessary remediation.

1. The purpose of a RI is to:

i. delineate the areal and vertical extent of contaminants in all media at or emanating from the site;

ii. determine the surface and subsurface characteristics of the site, including topography, geology and hydrogeology, including depth to groundwater;

iii. identify the sources of contamination, the migration pathways, and actual or potential receptors of contaminants on or through air, soil, bedrock, sediment, groundwater, surface water, utilities, and structures at a contaminated site, without regard to property boundaries;

iv. collect and evaluate all data necessary for a fish and wildlife resource impact analysis (FWRIA), pursuant to section 3.10, to determine all actual and potential adverse impact to fish and wildlife resources;

v. collect and evaluate all data necessary to evaluate the actual and potential threats to public health and the environment. This would include evaluating all current and future potential public health exposure pathways, in accordance with Appendix 3B, as well as potential impacts to biota; and

vi. collect the data necessary to evaluate any release to an environmental medium and develop remedial alternative(s) to address the release.

2. Where appropriate, the RI should also identify removal, treatment, containment, or other interim remedial measures, pursuant to section 1.11:

i. to remove, treat or contain any source areas identified, and

ii. prevent, mitigate, or remedy environmental damage or human exposure to contaminants while remedial alternatives are being evaluated.

3.2 General Sampling Considerations

(a) A SC or RI should be conducted based upon the information collected pursuant to the record search requirements of Appendix 3A; the analysis, reporting and quality assurance requirements of Chapter 2 and should satisfy the below noted media-specific requirements of this chapter.

1. The general considerations identified in subdivisions (b)-(d) below, if applicable.

2. The work plan requirements of section 3.3.

3. The building interior sampling requirements in section 3.4, if applicable.

4. The soil sampling requirements in section 3.5.

5. The soil vapor, sub-slab vapor, crawl space air, indoor air or outdoor air sampling requirements in section 3.6.

6. The groundwater sampling requirements in section 3.7, if applicable.

7. The surface water and sediment sampling requirements in section 3.8., if applicable.

8. The area-specific sampling requirements in section 3.9.

9. The background soil, groundwater, sediment and surface water sampling requirements in subsections 3.5.3, 3.7.3, 3.8.3 and 3.8.4, where applicable.

10. The fish and wildlife impact analysis requirements in section 3.10.

11. The historic fill requirements in section 3.11, where applicable.

(b) If required pursuant to an oversight document or other applicable rule, the remedial party will submit work plans pursuant to section 3.3 and reports pursuant to sections 3.13 and/or 3.14 in accordance with the schedules contained in the oversight document.

(c) Geophysical surveys may be included as a component of an investigation to identify subsurface anomalies. Typical geophysical surveying considered for site investigations include magnetometer surveys, electromagnetic terrain conductivity surveys, electrical resistivity surveys and

ground penetrating radar surveys. Geophysical techniques are recommended to delineate underground utilities such as conduits, water lines or underground storage tanks, or to focus test pit searches for buried drums, containers and metallic objects.

(d) Composite sampling should not be conducted for volatile contaminants. Compositing of samples for other contaminants is generally not acceptable when establishing the nature and extent of contamination in a SC or RI and for documentation or confirmation samples. Except when sampling for semi-volatile compounds associated with tank investigations as detailed in section 3.9 and in Table 5.4(e)10, compositing of non-volatile organic compound (VOC) samples can be proposed for DER approval in an applicable work plan.

3.2.1 Site Characterization

(a) A SC investigation is undertaken based on the information from the records search report to determine whether contaminants are present at the site at levels above unrestricted SCGs, groundwater standards or other applicable SCGs for the unrestricted use of a site.

(b) It may be appropriate to phase the investigation effort for the SC so that the areas of concern most likely to be contaminated above the applicable SCGs are sampled first and if confirmed will result in termination of the SC and initiation of a RI. In accordance with this provision it should be recognized that the full scope of work identified by subdivision (c) below may not be required.

(c) Sampling performed as part of the SC should be identified in the work plan for all potentially contaminated areas of concern, whether relating to current or former uses of the site.

1. Sampling should be biased to the suspected location of greatest contamination.

2. Sample locations should be based on professional judgment, area history, discolored soil, stressed vegetation, drainage patterns, field instrument measurements, odor or other field indicators.

3. Sampling locations should be designed in accordance with sections 3.4 through 3.9 and 3.11.

4. If access to sampling locations required pursuant to sections 3.4 through 3.11 is not feasible due to physical obstructions or safety hazards, and no feasible sampling alternatives are available, upon approval by DER, sampling may be modified subject to the technical criteria in paragraph 1.6(c)3. Where this is necessary:

i. confirmation of any approval by DER should be included in the SCR; and

ii. for verbal approvals, in accordance with subparagraph i above, the SCR should also note the date of the verbal approval and the name of the DER representative who granted the approval should be provided in written correspondence to DER within seven days of the verbal approval.

(d) All sampling methods and laboratory analyses should be conducted in accordance with Chapter 2. The full Target Compound List/Target Analyte List and TICs, in accordance with subparagraph 2.1(a)1.ii, should be sampled and analyzed for unless otherwise approved by DER.

3.2.2 Remedial Investigation

(a) A conceptual site model should be used, at the outset of a RI, to develop a general understanding of the site and to evaluate potential human exposure pathways and impacts to the environment. This will assist in identifying and setting priorities for the activities to be conducted. The conceptual site model should identify potential sources of contamination, types of contaminants and affected media, release mechanisms and potential contaminant pathways and actual/potential human and environmental receptors.

(b) Sampling of all media which exist at the site should be conducted to delineate the nature and extent of contamination and to provide a basis for the evaluation of remedial alternatives.

(c) Contaminant concentrations in background soils, sediments, surface water and groundwater may be used in the assessment to help determine whether a contaminant is related to a site. The RI work plan should consider the sampling necessary to evaluate background levels in accordance with this subdivision where appropriate for the remedial program.

1. The number and location of background surface soil samples must follow the procedure set forth in subsection 3.5.3 to establish site-specific background soil contaminant concentrations.

2. To support a claim that all or part of on-site groundwater contamination is caused by background groundwater contamination, the procedure set forth in subsection 3.7.3 must be followed.

3. Upgradient sediment and surface water samples (which are outside the influence of site contamination) may be used to establish background contaminant concentrations in sediments and surface water as detailed in subsections 3.8.3 and 3.8.4.

(d) Data quality objectives are to be considered when deciding the sample collection technique, the type of analysis and the level of data documentation.

1. Data quality objectives may include: defining the site's physical characteristics, physical and chemical characteristics of contaminant sources, nature and extent of contamination, potential receptors and associated exposure pathways, the fate and transport of contaminants, the development and evaluation of remedial alternatives, identifying SCGs, identifying the need for treatability studies and supporting future enforcement or cost recovery activities.

2. In determining the objectives, detection limits or minimum reporting limits must be capable of defining the nature and extent of contamination to levels consistent with the SCGs for the media being analyzed.

(e) The SCGs which pertain to the site location, site contaminants, and potential remedial actions must be identified and the probable SCGs must be listed in the remedial investigation report (RIR).

1. The chemical-specific SCGs must also be considered when preparing the sampling protocols for the site to ensure the use of appropriate analytical detection limits or minimum reporting limits.

2. A listing of SCGs applicable to the RI is included on the DEC website identified in the table of contents.

(f) If a building interior investigation is required by the criteria in section 3.4, it should be included as part of the RI.

3.3 Investigation Work Plans

(a) This section provides the basis for the preparation of any investigation work plans including those associated with SCs, RIs, pilot testing, pumping tests, predesign investigations/delineations or confirmatory/documentation sampling undertaken pursuant to this guidance.

1. Investigation work plans, once approved by DER, are used in the field to govern the identification of all field investigation aspects of a site remedial program. At a minimum, the work plan must include the elements identified in this section and the investigations must be supervised by a qualified environmental professional.

2. The work plan for a SC or RI should be prepared after the records search (a previously documented records search may be sufficient, if consistent with Appendix 3A) and a site visit. A site visit should be conducted before the work plan is developed to confirm and update the results of the records search and to note any access restrictions or other site conditions (e.g., the land uses around the site such as adjacent residential properties, schools, day care centers, etc.) which may affect the level of investigation. If the investigation is directed at either a specific discharge event or an underground storage tank or tank system, then a full records search may not be needed.

3. The work plan must include site-specific QA/QC protocols to be used during the investigation, which are developed in accordance with the requirements of section 2.3. The QA/QC section of the work plan is to:

i. determine whether a QAO will be required in accordance with paragraph 2.3(a)1;

ii. indicate the sampling and analytical protocols and data deliverables to be followed for obtaining and evaluating data of sufficient quality to support decisions during the remedial process;

iii. identify data evaluation requirements (data validation and/or a DUSR) and qualified data reviewers, in accordance with section 2.2, section 2.4 and Appendix 2B; and

iv. assure that the analytical methods identified provide a low enough detection limit or minimum reporting limit to compare with all applicable SCGs. A list of potential SCGs is available on DEC's website identified in the table of contents.

4. Include a HASP and CAMP, consistent with section 1.9, to be used during field activities. In addition:

i. community air monitoring consistent with section 1.9 may be needed for sites contaminated with VOCs or where particulates might be generated by investigative activities or nuisance odors may be encountered; and

ii. in addition to any worker safety measures required by law or regulation, where site conditions are not already well known appropriate monitoring instruments such as organic vapor analyzers (OVAs), photoionization detectors (PIDs), explosimeters, oxygen detectors and radiation

detectors are to be used to ensure personal safety and assist with characterization.

(b) Investigation work plans. The work plan must define the scope of work for the required investigation. In general, the elements of an investigation identified by this subdivision should be considerations for any investigation. Additional investigation elements which are more typically appropriate only for an RI are provided in subdivision (c) below.

1. A summary of any significant results of the records search and site visit, undertaken pursuant to paragraph(a)1 above:

i. with a focus on identifying historical chemical/petroleum product usage or disposal, potential contaminant sources and possible migration conduits including all subsurface utilities; and

ii. the presentation of any prior sampling locations on a separate figure. and analytical results with a summary and interpretation of those results.

2. Descriptions of the following, unless the investigation is directed at either a specific release, an underground storage tank or underground storage tank system:

i. the physical conditions of the site and surroundings, including a general description of soils, geology, hydrogeology and topography, including site drainage patterns; and

ii. a copy of the United States Geologic Survey (USGS) 7.5 minute topographic quadrangle that includes the site and an area of at least a one-half-mile radius around the site. This map should be the USGS revision in effect at the time of the report and must clearly note the site location.

3. A summary table of proposed sampling locations and analysis should be presented in the work plan text or on the sample location map specified in paragraph 4 below, which includes:

i. location (use the same alpha or numeric designation as shown on the scaled sampling location map);

ii. matrix (waste, soil, surface water, groundwater, sediment, air, soil vapor or biota as appropriate);

iii. sample depth (soils/ soil vapor/sediments/surface water) or water bearing zone to be sampled (groundwater);

iv. analytical parameters for each sample (for example, TAL metals or semi-volatile compounds);

v. sampling method, with minimum reporting limits to be achieved;

vi. the rationale for each sample (for example, to delineate the nature and extent of contamination, to assess potential human exposure/environmental impacts or to support potential remedies); and

vii. QA/QC samples (e.g., MS/MSD, duplicates, blanks), as needed.

4. A sample location figure which:

i. identifies the proposed sample locations

ii. is scaled appropriate to the area of the site and consistently applied in all reporting;

iii. is keyed to the site map;

iv. identifies site boundaries and property borders; and

v. shows significant site features including building locations, paved/unpaved areas, water bodies and wetlands.

5. A detailed schedule for all activities, including time lines and target dates for the start and completion of all field activities and submission of all reports to DER.

6. A list of the names, contact information and roles of the principal personnel who will participate in the investigation including the project manager, contractor and subcontractor contacts. Qualifications of these personnel:

i. must be included as an appendix to the work plan; and

ii. if the principal personnel designated on the project change, information for new personnel must be submitted to DER for approval, as set forth in the oversight document for the remedial program.

7. The name(s) and contact information for the remedial party contact and, if applicable a facility contact for the location the work is taking place.

(c) RI work plans. In addition to the requirements for investigations noted in subdivision (b) above, a more detailed level of effort or the investigation of additional aspects of a site may be required for an RI work plan.

1. In addition to the descriptions identified in paragraph (b)2 above, an RI work plan must:

i. identify and provide a map of all wetland areas on or near the site including wetlands in the "National Wetlands Inventory" and/or DEC regulated wetlands;

ii. the usage, distance to, flow direction (if appropriate) and names of surface water bodies, as well as for an initial survey the locations of public/private drinking water supply wells within at least one half mile of the site with emphasis upon water bodies and supply wells topographically or hydraulically down gradient of the site that may be in the path of site discharges or runoff. A map which shows the location of residences and other sensitive receptors must be included;

iii. land use within a half mile radius of the site boundary including proximity of the site to sensitive human or ecological receptors (e.g., residences, schools, parks, wetlands) including a database search of other known contaminated sites or spill sites in this area. See the discussion of land use factors to be considered in remedy selection in subdivision 4.2(i) to guide the identification; and

iv. any major infrastructure (storm drains, sewers, underground utility lines, piping tunnels, subways, etc.) and a discussion of whether such infrastructure may influence contaminant migration.

2. A description of each area of concern including approximate dimensions, suspected contaminants, suspected source of discharge, and potential receptors. Individual area of concern maps must be scaled at one inch to 40 feet or less to clearly indicate possible source areas and sampling locations.

3. Fish and wildlife resource impact analysis (FWIRA). Proposed sampling and analysis for the FWRIA Resource Characterization (Part 1) and Ecological Impact Assessment (Part 2), if determined necessary by DEC. To determine the FWRIA steps necessary for a work plan:

i. see subsection 3.10.1 to determine whether a FWRIA Part 1 is necessary and should be included in the scope of the RI work plan; and

ii. if required based on the Part 1, a FWRIA Part 2 using the scope of work for gathering the necessary data to perform the evaluations identified in subsection 3.10.2.

4. Qualitative exposure assessment. The qualitative exposure assessment for both human health and/or fish and wildlife resources required to be completed during the RI to qualitatively determine the route, intensity, frequency and duration of actual or potential exposures to contaminants. This assessment should:

i. describe the nature and size of the population currently exposed or which may reasonably be expected to be exposed to the contaminants that are present at or migrating from a site;

ii. include a determination of the reasonably anticipated future land use of the site and affected off-site areas;

iii. identify the reasonably anticipated future groundwater use;

iv. characterize the exposure setting, identifying current and reasonably foreseeable exposure pathways;

v. evaluate contaminant fate and transport;

vi. be developed in accordance with the following parts of this guidance:

(1) Appendix 3B, for human health exposure assessments; and

(2) subsection 3.10.1, for fish and wildlife exposure assessments; and

vii. include a full delineation of the nature and extent of off-site impacts; unless the remedial party is a volunteer in the BCP, in which event off-site field information is only needed sufficient to identify the presence of contamination and support the qualitative off-site exposure assessment for these sites.

5. Data collection needs for evaluating monitored natural attenuation (MNA) of groundwater are provided in subdivision (d) below.

(d) Work plans for evaluating MNA. When submitting an investigation work plan for a site where

MNA of groundwater may be evaluated during remedy selection, the remedial party should collect sufficient data to delineate the source of the contamination and to demonstrate to DER that groundwater contaminant concentrations will decrease to applicable groundwater or surface water standards through degradation, retardation, or dispersion under present site conditions, in a reasonable time frame, and if applicable that any human exposures will be addressed during the MNA time frame.

1. MNA may be evaluated by a RI and identified as a component of a remedy as an exit strategy for biodegradable groundwater plumes after source areas have been addressed to the extent feasible. Plumes that are naturally attenuating to a significant degree reach an apparently stable length (and then shrink) while concentrations along their centerline decrease over time.

2. MNA may be a viable remedial approach where it can be demonstrated that contamination attenuates naturally (and sufficiently) before impacting a sensitive receptor. To establish this the remedial party should evaluate the following to determine the viability of MNA as a remedy:

i. remedies to reduce or eliminate the contaminant mass representing the source of the groundwater contamination, as determined by free or residual product, soil exceeding the protection of groundwater SCO and dissolved phase delineation and dissolved contaminant concentrations;

ii. hydrogeologic and geochemical data used to demonstrate and quantify natural attenuation, such as dissolved oxygen, nitrate, iron, manganese, sulfate, methane content, oxidation/reduction potential or others as appropriate:

iii. presence or absence of microorganisms in soil and groundwater;

iv. groundwater flow velocity;

v. applicable physical and chemical characteristics of contaminants and contaminant degradation products present in both soil and groundwater;

vi. other wells and the location of those used for potable water supply;

vii. sorptive and desorptive characteristics of the soil; and

viii. other data deemed necessary by DER.

3. Monitored natural attenuation will only be considered a viable alternative where the source of contamination has been addressed pursuant to paragraph 4.1(d)2. Delineation of the source should:

i. adequately delineate the extent of any NAPL and/or grossly contaminated media in the unsaturated and saturated zones; and

ii. for MNA to be evaluated as a remedy, obtain sufficient data to develop treatment or removal alternatives for the source, if practicable, or containment if treatment or removal are not practicable, during the remedy selection evaluation in Chapter 4.

4. Consider the extent of soil contamination in the unsaturated zone, to allow the development of a MNA remedy(ies) which will remediate these soils to the applicable soil remediation

SCGs in accordance with a schedule approved by DER;

5. Continue to delineate groundwater contamination until the applicable groundwater or surface water standard for the nearest downgradient receptor or surface water body is reached;

6. Demonstrate that groundwater contaminated above the applicable groundwater standard will not reach the nearest downgradient receptor, using an appropriate groundwater flow/contamination transport model approved by DER.

7. Document the fate and transport of the contaminant plume;

8. Obtain sufficient information with respect to soil vapor intrusion to evaluate whether actions are necessary to address exposures related to soil vapor intrusion. This determination will be made on a case by case basis, pursuant to section 3.6; and

9. Demonstrate that predicted impacts to potential receptors are consistent with groundwater standards. This should include, without limitation, information pertaining to:

i. the existence of water lines;

ii. the locations which are or may be suitable for the placement of public water supply wells;

iii. proposed or future installation of water lines; or

iv. local and/or county ordinances restricting installation of potable wells.

(e) Management of investigation derived waste (IDW). An investigation work plan is also to identify provisions for management of IDW. This subdivision sets forth guidance for the handling and disposal of contaminated soil and water generated during an investigation, in a manner that does not pose a threat to public health and the environment and is compliant with applicable rules and regulations. Absent a regulatory exemption, the transport, storage and disposal of IDW is generally subject to one or more solid or hazardous waste regulations (e.g., 6 NYCRR Parts 360, 364 and the 370 series). Unless specifically noted herein, no guidance provided in this subdivision is intended to impose more stringent requirements than the applicable regulations regarding the handling, transport, storage or disposal of IDW.

1. Drill cutting and spoil disposal from on-site locations. Drill cuttings and other soil generated on-site during an investigation from the installation of soil borings, monitoring wells or geoprobes are presumed to be contaminated. Such cuttings and spoil:

i. must be stored on protective sheeting and covered with protective sheeting if cuttings remain on ground at the end of the day;

ii. may be disposed at the site within the borehole that generated them to within 12 inches of the surface or if the site is a residential site backfilling may be to within 24 inches of the surface, unless:

(1) free product, NAPL or grossly contaminated soil, are present in the cuttings;

(2) the borehole will be used for the installation of a monitoring well (cuttings may only be used to backfill boreholes installed for soil sampling);

(3) the borehole has:

(A) penetrated an aquitard, aquiclude or other confining layer; or

(B) extended into bedrock;

(4) backfilling the borehole with cuttings will create a significant path for vertical movement of contaminants. Soil additives (bentonite) may be added to the cuttings to reduce permeability;

(5) the soil cannot fit into the borehole as set forth in subparagraph i. above.

iii. cuttings meeting any of the conditions set forth in subparagraph i above, which cannot be disposed in the borehole must be containerized and handled as set forth in paragraph 3 below; and

iv. the borehole area must be restored, after backfill:

(1) in unpaved areas, by placing 12 inches of cohesive, compacted soil meeting the requirements for fill of subdivision 5.4(e) and Appendix 5 over the area of the borehole, unless the site is a residential site in such case 24 inches are required; or

(2) for paved areas, by placing clean cohesive, compacted soil in the borehole to sufficient depth to allow restoration of the paved surface; and

v. if the site includes streets, sidewalks or other publicly accessible areas, the off-site provisions in paragraph 2 should be applied to samples collected in those areas.

2. Drill cutting and spoil disposal from off-site locations not know to be contaminated. Cuttings and spoils generated from off-site locations during an investigation are to be managed as follows:

i. cuttings, may initially be placed on plastic as generated,, but should be containerized as drilling progresses. Overnight storage outside of a container is not allowed. The cuttings may be transported from the point of generation to a temporary on-site storage area without a 6 NYCRR Part 364 permit;

ii. cuttings from off-site boring locations are considered non contaminated until testing indicates otherwise, unless field screening results of the soil are positive for the presence of contamination; and

iii. the borehole will be filled with soil or a soil bentonite mixture and restored as set forth in clauses 1.iv. (1) or (2) above.

3. Drill cutting and soil disposal from known contaminated locations. Representative samples of drill cuttings or other IDW from known contaminated locations at a site or from off-site locations, identified in accordance with paragraphs 1 and 2 above, must be characterized for disposal. Such samples must be analyzed to ensure proper classification, treatment and disposal and where determined to be:

i. hazardous waste or a solid waste, must be properly managed and disposed at a properly permitted treatment, storage or disposal facility. Such waste will:

(1) be transported by a hauler permitted in accordance with 6 NYCRR Part 364;
(2) if such cuttings and soil are determined to be a hazardous waste, the waste shipment shall be accompanied by a manifest in accordance with 6 NYCRR Part 372; and
(3) any IDW soil identified as either a solid or hazardous waste, may be stored on the site in a secure area awaiting disposal, in accordance with applicable DEC waste management regulations or other provisions approved by DER; and

ii. soil not characterized as a solid or hazardous waste may be placed at the site, or returned to the off site location where it originated, in a manner set forth in the DER-approved work plan.

4. Test pits. When excavating test pits to delineate the extent of contamination, the soil removed from the excavation is to be managed as follows:

i. any drums or other containers encountered, as well as NAPL or other free product, will be over packed or otherwise containerized for appropriate off-site disposal, as discussed in subparagraph 2.ii above;

ii. where subparagraph i above does not apply, material removed may be placed back in the excavation in the same general strata from which it was removed; and

iii. the excavation shall be managed so as not to contaminate the surface of the site, all soil removed will be placed on plastic.

5. Investigation generated water/fluid handling and disposal. All water/fluid resulting from well development and/or well purging before sampling must be collected, handled and discharged/disposed of pursuant to applicable guidance and regulations. Water/fluid generated during an investigation:

i. is to be containerized upon production and is to subject to the following handling/disposal guidelines:

(1) 6 NYCRR Part 364 will not apply to the transport of the containers from the point of generation to a temporary on-site storage area, or treatment facility;
(2) the containers must be securely staged, pending appropriate disposal as set forth in subparagraph ii below;
(3) NAPL shall never be released to the ground;
(4) where containers include water mixed with NAPL, the water can be decanted from the NAPL (or vice versa) as long as a measurable layer of water remains with the NAPL, and the decanted water is NAPL- and/or sheen-free;
(5) groundwater from several monitoring wells may be combined provided they are associated with the same disposal site and aquifer; and
(6) NAPL may be collected from several containers and combined provided it all comes from monitoring wells associated with the same disposal site;

ii. it may be stored on-site in labeled containers in an area with secondary containment awaiting treatment and/or disposal, in accordance with applicable DEC waste management regulations (e.g., 6 NYCRR Parts 360, 364 and the 370 series) or other provisions approved by DER. The contents

of the containers will be

(1) properly treated or disposed of, when any of the following are observed:

(A) visual evidence of contamination, consisting of discoloration, sheens, free product or NAPL;

(B) olfactory evidence of contamination; or

(C) concentrations of contaminants above groundwater standards at levels of concern are known to be present in the monitoring wells, based on previous sampling of the groundwater; or

(2) if none of the conditions described in clause ii.(1) apply, the containerized water may be:

(A) recharged to unpaved ground into the same groundwater unit, within or directly adjacent to a source area in a manner which does not result in surface water runoff, with DER approval; or

(B) if a remedial treatment system designed to treat water is operational at the site the water may be added to the influent of the treatment system; and

(3) treatment or disposal of contaminated water/fluids will be at:

(A) a permitted off-site facility;

(B) an existing on-site permitted facility or a remedial treatment facility capable of treating the water/fluids, if one exists; or

(C) an on-site treatment unit brought to the site, properly designed to handle the water/fluids, where a permit waiver pursuant to section 1.10 has been granted by DER; and

iii. sediment that settles out of the IDW, provided there is no NAPL or free product present, must be handled and disposed in accordance with paragraphs 1 to 3 above, as appropriate for the location of the well.

6. Short-term surface water or groundwater discharges. Water resulting from pump tests or pilot studies conducted at a site pursuant to a DER approved work plan may be discharged to surface or groundwater providing the water meets, or is treated to meet, certain generic criteria. The generic discharge criteria for short term discharges can be found on the DEC website or may be obtained from the DER project manager.

(f) Evaluation of Natural Resource Injury.

1. The remedial party may elect to incorporate the collection of data necessary for a natural resource injury evaluation into a RI work plan.

2. The goal of a natural resource injury evaluation would be to collect data necessary to assess the existence of natural resource injuries, including the nature and extent of injury to soil, sediments, surface or groundwater, flora and fauna, caused by contamination. DEC's Division of Fish, Wildlife and Marine Resources should be consulted in the development of protocols for such data collection.

(g) The work plan should be organized to include the following as sections or appendices. Available investigation work plan template(s) available on the DEC website identified in the table of contents should be used, as directed by the DER project manager.

1. Introduction or purpose

2. Site history and description

3. Work plan objectives, scope and rationale

4. Quality assurance/quality control protocols

5. Health and safety protocols

6. Reporting and schedule

7. Citizen participation activities, references and appendices, as appropriate.

(h) Work plans for other investigations undertaken in support of other phases of the remedial program (e.g., pilot studies, pre-design delineations) should utilize any applicable guidance provided in this chapter.

3.4 Building Interiors

(a) The remedial program for a site is intended to investigate contamination of the real property comprising the site however, as set forth in paragraph 1 below, the SC or Ri of building interiors may be necessary. Where necessary it should be performed in accordance with this section.

1. The investigation of a building interior should be conducted when:

i. contaminants inside the building have the potential to migrate to and impact the environment outside of the building; or

ii. contamination or contaminated media outside the building have the potential to migrate into the building; or

2. The requirements for investigating contaminants inside buildings, or associated with tanks and above or below ground means of conveyance of solids or liquids of any kind including piping, plumbing, floor drains, vents, trenches, duct work, gutters, leaders, or fissures in floors, walls or ceilings that create pathways inside the building, which have the potential to migrate to the environment outside or under the building are found in the area specific investigation procedures specified in section 3.9

3. Requirements for investigating contaminants outside the building, which have the potential to migrate into buildings, potentially impacting public health, will be specified by DER on a site-specific basis.

(b) If evidence of prior activities or areas of concern are identified that may have impacted the building structure, an investigation must be undertaken as specified by DER.

(c) The investigation of asbestos, asbestos contaminate material (ACM) and lead-based paint should follow applicable state, federal and local guidance and regulations and. For asbestos or ACM, consultation with the NYS Department of Labor is required.

(d) Soil vapor intrusion in buildings is addressed in section 3.6.

3.5 Soil

3.5.1 Site Characterization

(a) SC soil investigations should satisfy the applicable elements of this subsection.

1. Initial site survey. The presence of potential source areas to be considered by the initial site survey are those AOCs identified in subdivision 1.8(c). Where the potential for buried drums, tanks, deposits of waste or other discrete and identifiable AOCs may exist the use test pits, ground penetrating radar, magnetometry, electromagnetic, or other techniques capable of detecting metal containers and other waste to an average depth of 20 feet or deeper should be considered.

2. Based on the findings of this survey and/or other AOCs identified by the records search to be undertaken in accordance with Appendix 3A and reported as set forth in section 3.12, soil sampling to characterize contaminant levels in surface or subsurface soil should be planned where:

i. there have been any indications of buried drums, tanks or waste;

ii. groundwater contamination is detected and no source has been identified;

iii. aerial photographic history of the site indicates the presence of drums, tanks or waste in or adjacent to regraded and/or filled areas;

iv. historic fire insurance maps, or other documentation, has identified the past presence of structures or operations (e.g., former manufactured gas plants) which are likely sources of contamination;

v. there are areas of soil staining;

vi. distressed vegetation exists; or

vii. bare soil is present.

(b) Surface soil sampling. Samples, except those being analyzed for VOCs as noted below, should be collected based upon the type of exposure or disposal to be assessed by the sample.

1. Assessing human exposures to soil. When assessing the human exposure resulting from soil contamination related to:

i. incidental soil ingestion, inhalation of soil or dermal contact with soil; soil samples should be collected from a depth of 0 to 2 inches below the vegetative cover, unless VOCs are the only contaminants of concern in which case the sampling should be from 0 to 6 inches; and/or

ii. vegetable/fruit gardens, soil samples should be collected from a depth of 0 to 6 inches below the vegetative cover.

2. Assessing ecological resource exposure to soil. When assessing the impact of soil

contamination on ecological resources samples should be collected from:

i. surface soil at a depth of 0 to 6 inches below the vegetative cover; and

ii. a deeper soil horizon, typically from 12 to 24 inches below ground surface.

3. Where both human and ecological resource exposures are being evaluated, samples at each depth may be required.

(c) Subsurface soil sampling. Samples should be collected via soil borings and/or test pitting for chemical analysis and to provide a profile of subsurface conditions in identified or suspected AOCs and in other areas as needed to characterize the site.

1. Boring logs should be prepared by a qualified individual, reporting to the site QEP, for all soil samples to document subsurface conditions including, without limitation:

i. soil types and description of non-soil materials;

ii. field instrument measurements;

iii. depth to groundwater, if groundwater is encountered; and

iv. to document physical evidence, if present, including but not limited to:

(1) soil mottling;
(2) presence of odor or vapors;
(3) soil discoloration or staining; and
(4) NAPL, free and/or residual product;

2. Soil should be described using the:

i. New York State Department of Transportation *Soil Description Procedure* (NYSDOT Soil Mechanics Bureau STP-2 dated May 1, 1975, as amended); or

ii. unified soil classification system (USCS) which is set forth in ASTM 2488.

3. Known hazardous waste, concentrated solid or semi-solid substances, soils with free product or NAPL and/or grossly contaminated media will not be returned to the subsurface and must be disposed of in accordance with applicable guidance and regulations. If contaminated materials are returned to the ground, in accordance with subdivision 3.3(e), the remedial party must address the presence of this contamination as part of any remedial action.

4. Soil sample locations should be documented by the use of GPS. They may also be photo-documented.

5. Samples should be collected continuously in discrete increments as grab samples prior to any consolidation of the sample. If less than full recovery is obtained by the sampling technique, an explanation should be provided in the soil log.

6. Additional sampling of soil from boring-depth increments below those specified in a work plan to investigate AOCs or based on observations as set forth in paragraph 3.5.1(a) 2 should be completed in cases where:

i. the surface has been regraded;

ii. evidence is identified in a boring of:

(A) the conditions identified in subparagraph 1.iv above;
(B) LNAPL, from the water table; or
(C) DNAPL, form the top of a confining unit; or

iii. other evidence is found which indicates the possible presence of contamination.

7. If the designated subsurface soil sampling point is within the saturated zone, when sample recovery is possible, a sample of the saturated soil should be collected and analyzed.

(d) The use of expedited site investigation approaches, such as the USEPA Triad, are encouraged.

1. Expedited site investigation involves systematic project planning, use of dynamic work strategies and field screening techniques.

2. Sampling methodologies using field-screening techniques:

i. have similar analytical limitations to laboratory methods, which are addressed in subdivision 2.1(c); and

ii. should be detailed in a work plan and approved by DER before use.

3. Field testing sampling plans should be prepared in accordance with Appendix 2A.

3.5.2 Remedial Investigation

(a) The RI should include provisions to identify all soil which may contain contaminants above the unrestricted use soil SCGs.

1. Soil sampling during the RI is intended to determine the areal and vertical extent of those areas found to be contaminated. Sampling locations should be biased toward locations expected to be contaminated or source areas, but must also provide sufficient coverage of the entire site to allow decisions relative to land use restrictions.

2. In addition, soil data is used in the exposure assessment to identify any actual, or potential for, exposure.

3. The use of the field-screening techniques/investigations (e.g., Triad) as described in subdivision 3.5.1(d) and Appendix 2B are encouraged to focus the location of surface or subsurface soil sampling to the most likely source areas, to minimize multiple mobilizations and obtain more complete data set and to indicate a potential for vapor intrusion into buildings.

4. Geophysical surveys. Geophysical surveys may be used as described in paragraph 3.5.1(a)1 and should also be considered during the RI to:

i. identify subsurface utilities as sources of discharge or preferential pathways;

ii. obtain geologic characterization of bedrock, clay layers, etc.; or

iii. focus test pit and/or soil boring locations to areas of subsurface anomalies.

5. Soil gas surveys may be used to identify areas of soil contamination which are a source of soil vapor, in accordance with section 3.6.

(b) Surface soil investigations.

1. Follow the sampling procedures identified in subdivision 3.5.1(b).

2. For suspected surface discharges. Soil samples to be analyzed/screened for VOCs should be collected to minimize contaminant loss during sampling. Each sample should be field screened with a properly calibrated photoionization detector or flame ionization detector (PID/FID) or other suitable instrument. When field screening is used the following should apply:

i. at a minimum, the initial 24 inches of soil rather than the surface soil sampling depths identified in subdivision 3.5.1(b) should be field screened for the presence of VOCs; and

ii. if field measurement readings are detected above background, the sampling should be extended until background readings are achieved, or groundwater or bedrock is encountered; or

iii. a sample from the interval registering the highest field-measurement reading should be collected and analyzed for VOCs.

(c) Subsurface soil investigations.

1. Subsurface soil sampling from soil borings, geoprobes and/or test pits/trenches, in addition to the areas described in paragraphs 3.5.1(a)2 and (c)6, is required in any area:

i. where it is likely that contaminants have migrated downward from the surface or were released below ground surface; for example, from dry wells, leach fields, injection wells or underground storage tanks;

ii. where the investigation of a geophysical or soil vapor anomaly suggests a possible contaminant source;

iii. where waste was or was reported to have been disposed. Such sampling should delineate the boundaries of the area impacted by the disposal; and

iv. when surficial contamination is known or suspected. Such sampling should determine the vertical extent of that contamination.

2. If VOCs are confirmed in the subsurface, the investigation should evaluate any

subsurface utilities, structures (with both basement and slab on grade) and/or other preferential pathways to identify additional sampling that may be warranted to determine whether actions are needed to address exposures associated with soil vapor intrusion, as a result of the soil contamination.

3. When any soil boring, geoprobe or test pit/trench is installed, written logs of the findings are to be prepared and maintained which include, but are not limited to:

i. the data identified in paragraphs 3.5.1(c)1 and 2;

ii. documentation and/or observations regarding the interface between waste and native soils (if appropriate);

iii. identification of the groundwater table and related observations, such as floating product or LNAPL;

iv. identification of the mobility of any contaminants, NAPL or free product identified; and

v. a photographic record of such excavation areas is also recommended to document subsurface features and observations.

(d) The investigation should gather sufficient data on contamination present in soil to evaluate the need for remediation or mitigation at the site.

3.5.3 Soil Background Evaluation

(a) This guidance is intended for soil background evaluations conducted as a component of a SC, RI or, where appropriate, at another element of the remedial program. Site background evaluations are not considered for use on-site at BCP sites.

1. If a suspected contaminant is identified in soil in excess of the unrestricted soil SCGs, the guidance in this subsection may be followed to demonstrate to DER that the concentration of the element, chemical or contaminant in the soils may be due to background conditions.

2. Area-wide soil background studies, intended to be applied to more than one site, may require an expanded level of effort to be determined after consultation with DEC.

3. Background evaluations typically focus on surface soils, although the same approach is applicable to deeper soil horizons.

(b) The remedial party may evaluate soil background conditions at a site using the approaches discussed in this subdivision. The evaluation of background conditions consists of a two-step process. The first step is gaining an understanding of soil conditions on-site and the second step is understanding the soil conditions off-site.

1. On-site soil conditions. Understanding conditions on-site includes an evaluation of whether:

i. the contaminant(s) of concern was(were) never used, stored, or disposed on or near

the site);

ii. (an) element(s) or chemical concentration detected in the soil at the site are within the ranges reported in appropriate references for naturally or regionally occurring background levels for New York. In doing so, the remedial party needs to consider the applicability of the rural background study (see subparagraph 2.ii, below) to the study area;

iii. the distribution of the element, chemical or contaminant in the soil does not follow a concentration gradient indicative of disposal or a discharge; and

iv. the presence of historic fill material.

2. Off-site soil conditions. The remedial party may employ one of the following three approaches to gain an understanding of off-site soil conditions:

i. use an existing DEC-approved background evaluation which was conducted generally in accordance with subdivision (c) below, for soils near the site to establish the background soil conditions;

ii. use the rural background study conducted by DEC, in collaboration with the New York State Department of Health, as part of the development of the soil cleanup objectives set forth at 6 NYCRR Part 375 as background soil conditions and available in the technical support document [see 6 NYCRR 375-6.2(b)]; or

iii. undertake a site-specific background evaluation, to demonstrate background conditions of the soil in the vicinity of the site, in accordance with subdivision (c) below.

(c) Site-specific background evaluation. A site-specific background evaluation will consider soil samples collected and analyzed from no less than five background sample locations in the vicinity of the site as detailed in this subdivision to assist in the characterization of site-related contamination. An evaluation intended to develop site-specific cleanup objectives is addressed in subdivision (d) below.

1. The background grab samples should be collected from:

i. a depth which conforms to the same depths of the surface soils sampled during the surface soil investigation;

ii. the 0 to 2 foot soil horizon if no surface soil samples were collected at an AOC or from the site.; or

iii. deeper horizons if appropriate based where the contamination is present

2. Background samples should be collected at locations which are:

i. unaffected by current and historic site operations, as documented by the records search;

ii. wherever possible, from locations which are topographically upgradient and upwind of contaminant sources; and

iii. off the site being investigated, unless the site being investigated encompasses a large area which includes separable areas having no identified AOCs.

3. Background samples should not be collected from potentially contaminated areas, including any of the following:

i. areas where materials or wastes were loaded, handled or stored;

ii. identified waste-disposal areas;

iii. areas which receive runoff from areas identified in subparagraphs i or ii above or adjacent contaminated sites;

iv. storm drain outfall discharges or ditches receiving runoff from the site or adjacent contaminated sites; or

v. any other area of concern, as defined by section 1.8;

4. Background samples generally should not be collected from the following areas unless it can be demonstrated that the contamination in the area is due to generally occurring pollution related to the urban or industrial nature (anthropogenic) of the surrounding area and the results will be compared to samples taken from similar areas on the site:

i. parking lots, roads or roadside areas;

ii. areas near railroad tracks;

iii. areas of historic fill material;

iv. storm drains or ditches receiving runoff not impacted by the site or adjacent contaminated sites; or

v. depositional areas outside the influence of known sources.

5. Background studies should use the same sampling and analytical methods as were used for other site samples.

6. Samples collected from a site or an area of concern cannot be averaged for background comparisons, rather the individual samples should be evaluated, in consultation with DEC and the NYSDOH to determine a background level for the site. Except for on-site at a BCP site, if contaminant concentrations are found at any sampling location on the site exceeding the background level developed from the background samples, the RI may delineate the extent of the contamination based on the background level, rather than the applicable unrestricted soil SCG.

7. The background evaluation should be presented in a work plan developed in accordance with section 3.3, if not included in the RI work plan.

(d) Site-specific remediation levels based on background concentrations. If a site-specific

background soil level identified by subdivision (c) above is to be proposed as a remediation level at the site, a more extensive sampling program to allow a statistical analysis of background levels may be required.

1. The remedial party should, after consulting with DER, submit a work plan outlining the proposed methods for the additional sampling and any proposed statistical evaluation of samples.

2. Where a grid or predetermined sample spacing is to be used in a site-specific evaluation , the limitations on the location of samples identified by paragraph (c)3 above are not applicable, because the investigation is intended to assess the impacts from other potential sources of contaminants in the vicinity of the site to the site-specific background.

3. Any statistical analysis should be in designed consistent with the rural background study data analysis methods provided in Appendix D, Section B of the *New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document (TSD) September 2006* or any subsequently approved applicable document, which is available on DEC's website identified in the table of contents.

3.6 Soil Vapor

(a) For guidance relative to recommended sampling protocols, quality assurance/quality control of sampling, analytical methods and the use of field laboratories/mobile gas chromatographs, as well as any updates to the sampling requirements detailed above, the most recent NYSDOH guidance document should be used. Soil vapor is considered an environmental medium that must be characterized during the investigation in accordance with this section.

(b) This section focuses on the collection of data which is used to determine whether actions are needed to address exposures to volatile chemical contamination related to soil vapor intrusion (SVI). Volatile chemical contamination may result from the presence of VOCs as defined at paragraph 1.3(b)76, and certain semi-volatile compounds such as napthalene.

1. The soil vapor pathway is to be investigated at any site where buildings are presently located, or may be constructed in the future, when:

i. a source of volatile chemical contamination in subsurface soil or groundwater is identified in the vicinity of the buildings or future building site; or

ii. based on known prior industrial, commercial or other land uses, a source of volatile chemical contamination in subsurface soil or groundwater may be suspected.

2. A soil vapor investigation should be used to evaluate the potential for SVI into buildings on or near a site during the:

i. SC, only in the event where the SC would conclude that no further investigation is warranted, as set forth in subparagraph 3.1(a)3.i, and no RI is necessary; or

ii. RI, where the conditions identified by paragraph 2 above exist.

3. The sampling to evaluate exposures related to SVI detailed in this section is applicable to

any building or structure, whether in residential, commercial or industrial use. In evaluating the level of effort necessary for a given property, after consultation with DER and NYSDOH, the preparation of a site-specific work plan may consider:

i. occupational exposures which may result from current commercial or industrial processes within a building; and

ii. hobbies or other activities conducted in a residential property which require the storage or use of VOCs.

(c) The initiation of investigation activities for characterizing the nature and extent of contamination in soil vapor should be determined on a site-by-site basis, taking into consideration the factors identified by this subdivision.

1. If little is known about the current site conditions, then the evaluation of contamination in other environmental media, specifically groundwater and soil, should usually proceed first. The results of these initial investigations, as well as other site information, should then be used to guide an investigation of soil vapor intrusion, such as the selection of locations for subsurface vapor samples based on likely migration pathways.

2. At sites where the investigation of SVI is necessary, and the locations of suspected source areas are reasonably known, it is prudent to initiate sampling sooner rather than later, given the iterative nature of the sampling process.

3. When sampling is initiated subsurface vapor conditions should be characterized prior to collecting indoor air samples. However, soil vapor samples are not always reliable predictors of the concentrations of volatile chemicals beneath the slab or basement of nearby buildings. In many cases predictions based on soil vapor concentrations using currently available models may underestimate the concentration of volatile chemicals in nearby sub-slab vapor samples.

4. At least some confirmatory structure sampling will typically be needed during a RI to rule out SVI related exposures if volatile chemicals are detected at levels of concern in the soil vapor near buildings. Using the modeling of soil gas concentrations is not sufficiently predictive of concentrations of sub-slab vapor or indoor air levels.

(d) An investigation of the potential for SVI into buildings is required where volatile chemical vapors, such as from VOCs, some SVOCs and mercury, are a concern.

1. Subsurface sources of volatile chemicals include the following:

i. groundwater or subsurface soil that contains concentrations of volatile chemicals in excess of their appropriate SCGs;

ii. NAPL;

iii. buried wastes; and

iv. subsurface waste storage or holding structures, (e.g., underground storage tanks, gas holders, etc.).

2. Site-specific conditions and findings often warrant different approaches, for example if underground utilities or the trenches they are installed in act as preferential pathways for soil vapor migration.

3. The process of investigating and evaluating the SVI pathway during the RI is an iterative one. During the RI, multiple rounds of sampling of subsurface vapor or structures may be necessary to:

i. evaluate fluctuations in concentrations due to:

(1) seasonal effects of different weather or building conditions. where:
(A) at least one round of sampling is collected during the winter heating season; unless
(B) non-heating season sampling has indicated the need for installation of a soil vapor mitigation system in the building;
(2) changes in source strength; or
(3) soil vapor migration or contaminant biodegradation processes;

ii. confirm sampling results or the effectiveness of the mitigation/remedial systems installed; and

iii. characterize the nature and extent of subsurface vapor, when appropriate, or indoor air contamination, similar to the delineation of a groundwater plume.

4. Sufficient sampling should be completed to evaluate:

i. whether soil vapor is contaminated, the nature and extent of this contamination and, if possible, the source(s) of the contamination;

ii. current and potential exposures to the contaminated soil vapor; and

iii. what actions, if any, are needed to address exposures and to remediate soil vapor contamination.

5. An investigation involves the collection of the four types of samples which are discussed in detail in subdivisions (e) through (h) of this section. The samples comprising a SVI investigation are:

i. subsurface soil vapor samples not from beneath a foundation or slab of a building, should be determined on a site-specific basis in consideration of the site conceptual model and sampling objectives, area to consider for this sampling include:

(1) rights of way or other locations in the area of concern:
(2) paved or otherwise confined areas adjacent to buildings; or
(3) if paved areas are not present when collecting soil vapor samples around a building, samples should be located in native or undisturbed soils away from fill material surrounding the building (approximately 10 feet away from the building) to avoid sampling in an area that may be influenced by the building HVAC systems, fireplaces, or mechanical equipment (e.g., clothes dryers or exhaust fans/vents) which may increase the infiltration of outdoor air into the vadose zone adjacent to the building. As a result, soil vapor samples collected in uncovered areas adjacent to the building may not be representative;

ii. sub-slab vapor samples from beneath a building basement or foundation slab;

iii. indoor air from the lowest floor of potentially impacted buildings, including crawlspaces;

iv. outdoor (ambient) air from locations near the area under investigation for soil vapor intrusion; and

v. in buildings with sumps, water samples may also be collected to assess exposures associated with direct off-gassing of volatile chemicals from contaminated groundwater.

(e) Soil vapor samples. Samples of the subsurface soil vapor or soil gas are collected to characterize the nature and extent of subsurface vapor contamination in the vadose zone.

1. Soil vapor sampling results may be affected by a number of geologic and human-made factors; therefore they should not be considered definitive indicators of the potential for SVI related exposures.

2. Soil vapor samples should be viewed as a tool for focusing attention on structures which may be impacted by SVI rather than as a vehicle for determining the specific nature of the exposure. Consequently, soil vapor samples may not need to be collected at sites where other data are sufficient for identifying potentially impacted structures.

3. Subsurface soil vapor samples may need to be collected:

i. from both on-and off-site areas, as described in subdivision (c) above; and

ii. in the case of groundwater sources, from:

(1) the stratigraphic horizon immediately above the water table; and
(2) at a stratigraphic horizon thought to reflect potential conditions at nearby sub-slabs, not necessarily the foundation depth.

4. If available, existing environmental data (e.g., groundwater and soil data) and site background information should be used to select locations for sampling soil vapor. Soil vapor samples should be collected to get a general understanding of the nature and extent of soil vapor contamination. Samples should be considered in areas:

i. with either known or suspected subsurface sources;

ii. where elevated readings were obtained with field equipment (e.g., PID) during previous soil and groundwater investigations; and

iii. with varying concentrations of contamination in the upper groundwater regime, at appropriate depths, dependent upon site-specific conditions.

5. Subsurface soil vapor sample locations will vary depending upon:

i. surface features, such as the presence or absence of buildings, areas of pavement or

vacant lots;

ii. subsurface characteristics, such as soil stratigraphy, buried structures or clay lenses; and

iii. the specific purpose of the sampling.

6. The following must be included in all soil vapor sampling work plans:

i. a figure illustrating proposed sampling locations (with respect to both areal position and depth) and relevant on-site and off-site features; and

ii. the rationale for proposing the locations.

(f) Sub-slab vapor samples. Samples of sub-slab vapor are collected to characterize the nature of subsurface vapor contamination beneath buildings.

1. Investigations of sub-slab vapor contamination should proceed from known or suspected sources outward on an iterative basis, as far as necessary, until potential and current human exposures have been adequately delineated.

2. In cases of widespread soil. vapor contamination a "blanket mitigation" approach within a specified area of documented soil vapor contamination may be considered as the basis for making decisions. In such cases a representative number of buildings from an identified study area, rather than each building, may be sampled. Prior to implementing this type of sampling approach, it must be approved by DER.

3. Sub-slab vapor samples collected directly beneath buildings provide the most reliable and representative information regarding SVI potential, and should be collected when possible. The distribution of volatile chemical contaminants beneath a building slab:

i. may not be homogeneous (i.e., a sub-slab vapor sample collected from one area of a building may differ by as much as an order of magnitude from a sample collected in another area of the building); and

ii. sub-slab data from a particular sample should not be viewed in isolation, but rather, should be viewed in the context of results from other sub-slab samples from the same and/or nearby buildings and in the context of the results from sampling other environmental media.

4. Sub-slab vapor samples should be collected:

i. in a representative number of buildings directly above or adjacent to contaminated soil, groundwater or other known or suspected subsurface sources of soil vapor contamination; and

ii. at a minimum one sampling event must be during the winter heating season with windows and doors closed and the heating system operating, unless previous no-heating season sampling has already established the need for mitigation.

5. When selecting buildings for sub-slab vapor sampling, the buildings sampled should

include, at a minimum:

i. residential dwellings, located above or directly adjacent to known or suspected areas of subsurface volatile chemical contamination;

ii. those where positive responses with field equipment (e.g., PID) suggest a completed migration pathway; and

iii. those within known or suspected areas of subsurface volatile chemical contamination that are used or occupied by sensitive population groups (e.g., daycare facilities, schools, nursing homes, etc.).

6. Within a building, sub-slab vapor samples should be collected:

i. in a central location away from walls;

ii. from the soil or aggregate immediately below the basement slab or slab-on-grade; and

iii. from each representative foundation area or type the number of sub-slab vapor samples required in a building depends upon the size of the building and the number of slabs and/or foundation types or extensions. Multiple sub-slab vapor samples may also be considered if previous sampling results differ from the conceptual site model or from the results of nearby structures or in structures with unexpectedly high indoor air results.

7. Sub-slab vapor sampling is not applicable for buildings with earthen floors or unlined crawlspaces. In these instances, a case-by-case determination must be made to determine whether crawlspace air samples should be collected to evaluate the potential for human exposures.

(g) Indoor air samples from buildings. Indoor air samples are collected to characterize the nature and extent of air contamination within on- or off-site buildings and to evaluate current human exposure to volatile chemicals.

1. The considerations in selecting which buildings to sample indoor air should be similar to those for sub-slab vapor sampling set forth in subdivision (f) above.

2. A building questionnaire and product inventory must be completed during the sampling event to identify preferential pathways, building features, products containing volatile chemicals, etc. that may affect the interpretation of the sampling results.

3. Indoor air samples are usually collected concurrently with sub-slab soil vapor samples, and outdoor air samples, except when:

i. site-specific situations may warrant collecting indoor air samples prior to characterizing subsurface vapors. This is generally due to the need to examine immediate inhalation hazards in situations which include, but are not limited to:

(1) a response to a spill event (e.g., petroleum spill);
(2) high readings obtained in a building when screening with field equipment;

(3) the presence of significant odors (e.g., petroleum compounds); or
(4) contaminated groundwater where the building is prone to groundwater intrusion or flooding;

ii. if indoor air contamination has been documented prior to characterizing contamination in subsurface vapors, resampling of the indoor air simultaneously with sub-slab vapor and outdoor air (at a minimum) will most likely be necessary to evaluate the indoor air results adequately; or

iii. when confirming the effectiveness of a sub-slab depressurization system.

4. Indoor air sampling should also be considered for buildings where previous sub-slab vapor samples identified elevated concentrations of contaminants; however no indoor air samples were collected. This indoor sampling event should also include the collection of another concurrent sub-slab vapor sample.

5. Indoor air samples, when necessary, should be collected from the following locations:

i. crawlspace areas, depending upon building-specific conditions (e.g., mixed foundation types etc.);

ii. the building basement at a height approximately three feet above the floor to represent breathing zones, in the following areas:

(1) locations where soil vapor infiltration is identified or suspected; or
(2) absent apparent or identified areas of infiltration, in a central; and

iii. for a commercial setting, from multiple tenant spaces (where there is not a common basement) at a height approximately three feet above the floor.

6. Indoor air samples should always be collected simultaneously with an outdoor air sample (see subdivision (h) below) and with sub-slab vapor samples, where possible.

7. Based on the results of the indoor air samples from the areas described in paragraph 2. above, DER may require additional sampling.

(h) Outdoor air samples. Samples of the outdoor (ambient) air are collected from the immediate vicinity of any indoor air sampling to characterize ambient air conditions.

1. These samples must be collected simultaneously with indoor air samples, whenever indoor sampling is undertaken and may be collected at DER's request concurrently with subsurface vapor samples.

2. Outdoor air samples should be collected from locations which are:

i. upwind of the buildings being investigated;

ii. away from wind obstructions (e.g., trees or bushes);

iii. away from obvious sources of volatile chemicals (e.g., automobiles, lawn mowers, oil storage tanks, gasoline stations, industrial facilities, etc);

iv. at a height approximately three feet above the ground, so as to represent breathing zones; and

v. for buildings with HVAC systems that draw outdoor air into the building, an outdoor air sample collected near the outdoor air intake may be appropriate.

3. With DER concurrence, one outdoor sample may be used for multiple buildings in the same vicinity when concurrent indoor air and sub-slab vapor sampling of the buildings is performed.

(i) For guidance on completing an investigation to determine whether actions are needed to address exposures related to soil vapor intrusion, New York State's most recent SVI guidance and associated updates should be used. For example, relative to recommended sampling protocols, quality assurance/quality control of sampling, analytical methods and the use of field laboratories/mobile gas chromatographs, as well as updates to the sampling requirements detailed above, the most recent NYSDOH guidance should be used.

3.7 Groundwater

3.7.1 Site Characterization

(a) At a minimum, each SC will require three cased overburden groundwater monitoring points to determine groundwater flow direction and quality. These wells are to be located, screened, developed and sampled in accordance with the approved work plan.

1. The results of any groundwater SC should be evaluated as follows, if:

i. the contaminant concentrations found in all groundwater samples are below the applicable groundwater SCGs, no further investigation is necessary for groundwater; or

ii. groundwater contamination is detected above applicable SCGs, unless solely attributable to an off-site source as set forth in 375-1.8(d)(2), a groundwater RI should be conducted.

2. When the contaminant concentrations found in any groundwater sample(s) exceed the applicable SCGs as set forth in subparagraph 1.ii above:

i. the groundwater may be re-sampled to confirm the presence of contamination;

ii. this sampling should consider at least one additional sample round, taking into account the seasonal variability (wet or rapid snow melt versus dry) of the site area; and

iii. an additional monitoring well or wells near the upgradient property line may be considered to evaluate a possible off-site source of the contamination.

3. Where no overburden groundwater is present and contamination is identified in the soil, the proximity of bedrock and nature of the contaminant (DNAPL) must be considered in evaluating the need for a bedrock well investigation in the SC or an RI should be proposed.

4. If a release directly to bedrock has occurred.

(b) The baseline considerations for remediation set forth in paragraphs 4.1(d) 2 through 4 are to be considered in assessing the need for further investigation.

3.7.2 Remedial Investigation

(a) When groundwater contamination is confirmed based on the SC at levels exceeding groundwater SCGs or significant contamination of soil by water-soluble contaminants is identified, a groundwater RI is necessary.

1. The purpose of the RI for groundwater is to:

i. delineate the nature and extent of any contaminant plume in the overburden and/or bedrock aquifers (LNAPL, DNAPL and dissolved) on an areal and vertical basis;

ii. identify actual or potential impacts to sensitive receptors;

iii. consider the physical and chemical properties of the contaminants of concern;

iv. determine whether the contaminant plume is expanding, contracting or stable; and

v. gather sufficient data to evaluate groundwater alternatives, including as appropriate MNA.

2. Groundwater RIs must also comply with the quality assurance and quality control requirements described in Chapter 2.

(b) The scope of work for the remedial investigation should include work tasks to address the applicable requirements of this subdivision.

1. Delineate the vertical and areal extent of groundwater contamination and the sources of such groundwater contamination, without regard to property boundaries. This includes, but is not limited to, the extent of both dense and light, non-aqueous-phase liquids (NAPLs). [Note: Volunteers in both the VCP and BCP need only gather sufficient data to perform an off-site exposure assessment.]

2. The RI must determine which on-site sources contribute to that contamination and should collect sufficient data to evaluate remedial measures to address that contamination.

3. The presence of NAPL should be considered when contaminant concentrations in groundwater exceed 1% of the solubility of the compound in question in water. In these instances, the investigation should include:

i. at a minimum, a boring to the first aquitard identified for visual observation and head space screening of soil samples, unless the contamination can be clearly associated solely with an LNAPL;

ii. if DNAPL is identified or remains suspected, a short-screened well should be placed directly on top of the aquitard for groundwater sampling and observation; and

iii. if LNAPL is identified or remains suspected, a well should be screened across the water table for groundwater sampling and observation.

4. Determine the direction of groundwater flow and impacts to groundwater as follows:

i. at a minimum, three groundwater monitoring wells or piezometers are required in each affected aquifer or water-bearing zone to determine the groundwater flow direction in that zone. The monitoring wells or piezometers must:

(1) be installed properly in accordance with the work plan; and
(2) be surveyed relative to a permanent surface structure to provide for adequate triangulation; and provide the survey data to DER in an acceptable format (e.g., North America Datum 83 [NAD83]);

ii. monitoring of multiple water-bearing zones (including bedrock aquifers if appropriate) may be needed to define the vertical hydraulic gradient and potential for migration of contamination in groundwater:

(1) for contaminants which are heavier than water; or
(2) where contaminants have migrated a significant distance from their sources, thus having a greater amount of time to be displaced downward;

iii. at least one round of synoptic static water levels, within the shortest time period practicable, must be obtained to provide a site-specific indication of the groundwater flow direction;

iv. if the site is located in an area that is influenced tidally or by human-made structures (dams which may greatly change the levels of surface water bodies), synoptic ground and surface water levels should be collected using data-logging pressure transducers (or similar devices) continuously for two tidal cycles from all applicable wells and the surface water, during a fair weather sampling event; and

v. water-level measurements and groundwater flow determinations must take into account activities in the area or human-made structures (dams which may greatly change the levels of surface water bodies), which affect flow direction, such as local dewatering activity and/or steady rate, variable rate or seasonally used pumping wells. The water levels should also be taken periodically to evaluate temporal or seasonal variations inflow direction.

5. Adequately characterize the impacted aquifer at the site. This may be accomplished by:

i. conducting aquifer tests which may include:

(1) pumping tests;
(2) packer tests;
(3) slug tests; or
(4) other appropriate analysis;

ii. where aquifer testing is conducted, it should include provisions for gathering the following data:

(1) the hydraulic gradient on, and in the vicinity of, the site;
(2) sustained well yield;
(3) hydraulic conductivity (K);
(4) permeability; and
(5) an estimate of the rate of groundwater and contaminant flow in the aquifer; and

iii. if pumping the aquifer is to be evaluated as an alternative for remediation, a pumping test to determine additional aquifer characteristics such as transmissivity and storativity should be considered.

6. DER relies on the proper characterization of groundwater impacts using groundwater analytical data. However, in some instances, groundwater analytical data may be supplemented with groundwater modeling to assess contaminant fate and transport. If a model is used to simulate groundwater flow and/or contaminant fate and/or transport, the remedial investigation report (see section 3.14) should include:

i. documentation that the model type and application where appropriate, along with a justification as to why the model was selected;

ii. specific details on the type of model, and the model application such as, but not limited to, input parameters used and referenced, boundaries and limitations, calibration and matching data and success, and application intent and/or strategy of the model;

iii. data presented graphically as groundwater gradient and contaminant plume maps. Electronic data files, in accordance with section 1.15, used to present the data, including the base map and all figures presenting investigation result, must be included with the report; and

iv. conclusions drawn from modeling should be verified with field data generated by the RI.

7. If there is a current or likely release of contaminants to off-site receptors, a well search must be conducted, including:

i. a file search using available DEC, NYSDOH, county health departments and if available, local records for all:

(1) monitoring wells and domestic wells potentially impacted by the site; and
(2) irrigation, industrial and/or public supply wells within one half mile of the site boundary;

ii. if applicable, the type of well and the status of the well (active, inactive or properly abandoned). Including if available, total depth, casing length, open bore hole or screened interval, sample analysis (if available), copies of well records and or well logs on file with DEC, NYSDOH, county health departments or appropriate county/local water authority, and any additional records available in county or municipal records should be included; and

iii. a listing of all sources referenced in performing the well search, including agencies that were unable to provide the information requested. If sufficient data cannot be obtained from existing

records to exclude the presence of potable, domestic or public supply wells within one-half mile of the site boundary, a door-to-door survey or well survey mailed to property owners in the area should be undertaken to provide the data. The limits of any survey may be expanded based on the findings of the extent of groundwater contamination.

8. Sample any existing potable and supply wells identified in the well search which are potentially impacted by the site.

9. Evaluate any surface water body that may be impacted by the contaminated groundwater in accordance with section 3.8.

10. The investigation should evaluate any subsurface utilities, structures (with both basement and slab on grade) and preferential pathways to identify additional sampling that may be warranted to determine whether actions are needed to address exposures associated with soil vapor intrusion, as a result of the groundwater contamination. Measurement of oxygen levels, lower explosive limits (LEL) and the presence of organic vapors should be included in this evaluation, as appropriate.

11. Consideration should be given to the collection of groundwater samples at the top of the water table as part of the evaluation of contaminant migration to soil vapor, to determine if the groundwater in this zone is contaminated. Clean groundwater in this zone, above deeper contamination, may eliminate the need for a SVI investigation.

12 Evaluate the current and potential groundwater uses.

13. The investigation of each area of concern should include at least one groundwater sample from each monitoring point.

(c) The RI of groundwater should be conducted according to the technical requirements identified by this subdivision.

1. The quality assurance requirements should be as set forth in section 2.3.

2. All monitoring wells should be installed in accordance with industry standards.

3. Groundwater samples may be taken pursuant to any generally acceptable sampling methods pursuant to subdivision 1.6(c). Sampling techniques generally acceptable to DER include, obtaining groundwater samples from monitoring wells, from well points, through slotted augers, using direct push, Geoprobe® or Hydropunch® techniques.

4. Monitoring wells, piezometers or other groundwater sampling points (e.g., Geoprobe® or Hydropunch® techniques) should be located in:

i. the excavation of any source(s) of contaminants, if possible, including without limitation, tanks, tank distribution systems, seepage pits, septic systems, dry wells or other injection wells;

ii. any suspected or confirmed source areas/AOCs; and

iii. the known or expected downgradient flow direction from the area identified in subparagraphs i and ii above.

5. Placement of monitoring wells, piezometers or other groundwater sampling points to evaluate the direction of ground water flow and contaminant migration in ground water should be placed:

i. in the expected down gradient flow direction of the area being evaluated and within 25 feet of the area of concern/source identified in paragraph 4 above. Groundwater flow direction should be predicted based on:

(1) topographic relief, the location of surface water bodies, structural controls in the bedrock or soils, location of pumping wells and subsurface conduits at or below the water table; or
(2) data from adjacent sites if groundwater flow direction at the adjacent site has been determined pursuant to paragraph 3.7.2(b)4;

ii. where groundwater flow direction is uncertain, it must be determined by the placement of at least three wells/piezometers in each affected aquifer or water-bearing zone to conclusively determine groundwater flow direction in that zone; and

iii. should also consider site related conditions, including but not limited to:

(1) topographic relief;
(2) the location of surface water bodies;
(3) structural controls in the bedrock or soils;
(4) location of pumping wells;
(5) the density of suspected contaminants (DNAPLs);
(6) subsurface conduits at or below the water table; and
(7) potential off-site sources of groundwater contamination.

6. The minimum number of groundwater samples collected should be as follows:

i. at least one groundwater sample for each area of concern which is classified as an underground injection control (UIC) unit as defined by the USEPA, including without limitation, a seepage pit, septic system, dry well or other injection well sampled pursuant to paragraph 3.9(e)3;

ii. for sites with leaking underground storage tanks and tank fields:

(1) containing up to three tanks, at least one groundwater sample location down gradient of the tanks;
(2) sites with more than three tanks, may require additional sample locations; and
(3) if a leaking tank is excavated, the groundwater sampling point should be located within the excavation;

iii. pump islands and associated piping greater than 25 feet from the tank field should be considered separate areas of concern and should require a separate groundwater sample location; and

iv. at least one groundwater sample for all other areas of concern, unless the area of concern is within 25 feet and hydraulically upgradient of another groundwater sampling location.

7. Drilling logs and well construction logs must be prepared and maintained for all monitoring locations.

8. Typically, a minimum of two rounds of groundwater samples are analyzed from each monitoring well installed as part of a RI:

i. the first round of groundwater samples should be analyzed for all suspected site-related contaminants;

ii. the second round of sampling may be modified to eliminate non-critical wells and/or eliminate specific parameters based on the analytical results of the first round, with DER approval; and

iii. where more than one round of sampling is needed, it is desirable to have sampling events coincide with seasonal high and low water;

9. The results of the RI groundwater analyses should be evaluated in accordance with subdivision 3.7.1(b).

(d) For contaminants that in their pure phase and at standard state conditions (20 degrees Celsius to 25 degrees Celsius and one atmosphere pressure) have densities greater than water, NAPL will be suspected to be present if the contaminant is detected in groundwater at concentrations equal to or greater than one percent of the water solubility of the contaminant if groundwater contains only that organic contaminant. If a mixture of such contaminants is present, then the effective water solubility of the contaminant should be estimated for this determination.

(e) Hydraulic conductivity and flow velocities should be determined using field tests and appropriate calculations.

3.7.3 Groundwater Background Evaluation

(a) This guidance is intended for site-specific groundwater background evaluations for a SC, RI, or other element of a remedial program.

1. If a suspected contaminant is identified in groundwater in excess of the applicable groundwater SCGs, the guidance in this subsection may be followed to demonstrate that the concentration of the element, chemical or contaminant in the soils is due to site-specific background conditions.

2. Area-wide groundwater background studies, intended to be applied to more than one site, may require an expanded level of effort to be determined after consultation with DER.

3 A background groundwater concentration is the concentration of:

i. chemical compounds or contaminants found in the groundwater which are attributable to either an upgradient source of contamination; or

ii. metals which represent natural conditions in the groundwater at the site.

4. Background groundwater contamination may include impacts to on-site groundwater which:

i. are solely attributable to an off-site upgradient source [6 NYCRR 375-1.8(d)(2)]; or

ii. the result of parent compounds of contaminants detected at off-site upgradient locations, where daughter products of these parent compounds are detected on the site.

(b) If groundwater contamination is detected above applicable SCGs the approach outlined by this subdivision may be used to demonstrate that all or part of the contamination is due to background groundwater contamination.

1. Groundwater flow direction should be determined pursuant to paragraph 3.7.2(b)4.

2. A minimum of one background monitoring well should be installed in each water bearing zone that is believed to contain background groundwater contamination.

3. Where an upgradient source impacting site groundwater is suspected, additional monitoring wells should be installed at sufficient locations in each zone identified in subdivision 3.7.2 (b) above to conclusively evaluate whether groundwater quality is being impacted by off-site sources and the contribution of the off-site groundwater to any on-site groundwater quality impacts. Such background monitoring wells should be located:

i. beyond the influence of all on-site areas of concern;

ii. at the upgradient property boundary of the site provided no on-site areas of concern are in the vicinity of, or extend beyond, the property boundary;

iii. such that the off-site groundwater impacting this well will migrate along a predicted groundwater flow path that will intercept the area of concern; and

iv. outside the zone of influence of any nearby pumping wells that would prevent up gradient groundwater from flowing onto the site.

4. Background monitoring well(s) should be sampled concurrently with collection of on-site groundwater samples for all on-site contaminants believed to be originating from background sources.

5. The results of a background groundwater investigation should be evaluated as follows:

i. no further investigation is required for groundwater if:

(1) there is no evidence of an on-site discharge; and

(2) contamination is present in the background monitoring well(s) at similar or greater concentrations than is present on the site; or

ii. additional investigation may be required when contamination is present in the monitoring well(s) in the area of concern but not in the background monitoring well, or contamination is present in both the area of concern and the background monitoring wells. In these cases, the evaluation should consider:

(1) the contribution of the background contamination in the determination of the

applicable groundwater SCGs for the site; and

(2) factors for determining the contribution of any upgradient off-site contamination to on-site contamination should include, but not be limited to, contaminant attenuation rates, contaminant degradation rates, and groundwater flow velocity.

(c) The remedial party must notify DER if it believes, pursuant to paragraph (b)5 above, that a source of groundwater contamination is identified upgradient of the site. DER will evaluate the data and determine if the groundwater contamination is attributable to background or if further investigation of an upgradient source is warranted.

3.8 Surface Water, Sediments and Wetlands

3.8.1 Site Characterization

(a) The remedial party should determine in the SC if there is any evidence that a surface water body or wetland is on or proximate to the site.

1. The following data should be collected to identify potentially proximate surface water or wetlands:

i. distance to the surface water body or wetland;

ii. likely location where the contaminants of concern from the site would discharge into a surface water body or wetland;

iii. flow direction and depth of any groundwater contamination plume(s) in relation to such water body or wetland;

iv. water body classification pursuant to 6 NYCRR Parts 700-705;

v. any known jurisdictional status and classification of the wetland (e.g., regulated by the State or federal government);

vi. lake or pond acreage or stream-flow rate; and/or

vii. any additional information to support this evaluation which may be identified in accordance with paragraph 3.3(b)2 and subdivision 3.10.1(b).

2. If a surface water body or wetland is determined to be on or proximate to the site, the characterization should evaluate whether:

i. contaminated soil is present at the surface of an AOC which is proximate to the water body or wetland;

ii. contaminated groundwater flows to the nearby surface water;

iii. discharges from the site have occurred (historic) or are occurring and are impacting such surface water body or wetland by way of:

(1) contaminated groundwater migration;
(2) subsurface NAPL migration;
(3) storm sewers, ditches or other methods of conveyance; or
(4) erosion of soil from the site;

iv. historic disposal from the site to the water body or wetland has occurred; or

v. contaminated sediment, soil or surface water are present within the water body or wetland, where the contamination may be attributable to a discharge or disposal per subparagraphs iii and iv above.

3. Where there are known, suspected historical or on-going discharges to the surface water body or wetland, determined pursuant to paragraph 2 above, the characterization should consider evidence of impacts to a surface water body or wetland as follows:

i. stressed vegetation, sheens, seeps, discolored soil or sediment along the shoreline, or on the bottom, or the surface, system hydraulics such as stream flux (the rate at which a stream is gaining or losing water);

ii. evidence of stream or wetland impacts from historical discharges including historical ecological studies documenting differences in organism population density and diversity in areas potentially impacted by the site relative to areas not impacted by the site;

iii. existing on-site groundwater contamination in excess of the applicable groundwater SCGs: or

iv. applicable soil, sediment and/or surface water SCGs are exceeded within the water body or wetland, where the contamination may be attributable to a discharge or disposal from the site as per subparagraphs 2.iii and iv above.

4. Where ongoing discharges are identified an IRM should be considered if impacts can be mitigated by immediate action.

(b) If there is evidence that discharges to the surface water body or wetland have occurred, pursuant to subdivision (a) above, then further investigation of either or both media is required in a RI.

3.8.2 Remedial Investigation

(a) Any surface water, wetlands or sediments which may have been impacted by contamination emanating from the site are to be investigated by the RI consistent with this subsection. Wetlands to be investigated include both regulated and unregulated wetlands.

1. Surface water and sediment investigations should be designed to:

i. account for tidal, seasonal or short-term flow, turbidity and water quality fluctuations due to dry versus wet-weather flow;

ii. system hydraulics, obtaining flow proportioned samples where applicable;

iii. potential contaminant characteristics, for example; density, solubility and hardness for metals analysis;

iv. define the vertical and horizontal extent of site-related contamination;

v. characterize the potential for exposure to receptors; and

vi. characterize patterns of erosion and sediment transport.

2. Sampling locations should be adjacent to and downstream of the contaminated site at any:

i. existing point source discharges from that site;

ii. zone of identified contaminated groundwater discharge;

iii. identified depositional areas;

iv. areas of disposal, proximate to the surface water or wetland;

v. areas of erosion, from AOCs proximate to the surface water or wetland;

vi. floodplain areas adjacent to impacted sediments or surface water; or

vii. other identified discharge locations.

3. Water and sediment analysis must include each constituent of concern disposed of at a site with at least one sample set taken during critical, low-flow conditions. All sediment samples should also be analyzed for total organic carbon.

4. Depending on site-specific conditions, additional samples or upstream locations may be necessary to define loads from other point sources, tributaries and/or other non-point sources.

(b) Surface water sampling. Surface water samples are required when there is evidence that surface water has or may have been impacted by contamination emanating from the site. The RI of surface water should be conducted according to this subdivision and the sampling, reporting and quality assurance requirements of Chapter 2.

1. Surface water sampling should be designed to evaluate:

i. either flowing or standing water bodies, considering tidal influence, as applicable;

ii. upgradient, downgradient and discharge point water samples, as appropriate;

iii. impact of turbidity on the results, particularly for metals; and

iii. if applicable, water quality near public/private surface water intakes.

2. Surface water sample locations. Samples should be considered in the surface water body

adjacent to any of the areas identified in paragraphs 3.8.1(a)2 and 3.

3. Where on-site groundwater contamination in excess of the applicable surface water criteria is proximate to a surface water body it should be delineated to the applicable surface water criteria. Groundwater plume delineation samples should be collected along the groundwater flow path between the AOC or plume and the surface water body and analyzed for applicable contaminants.

(c) Sediment sampling. As part of the RI, sediments in proximate surface water bodies or wetlands should be analyzed when there is reason to believe the sediments may have been impacted by contamination emanating from the site. The RI of sediments should be conducted according to this subdivision and the sampling, reporting and quality assurance requirements of Chapter 2.

1. Samples should be collected to meet the requirements of the appropriate fish and wildlife resources impact analysis, set forth in section 3.10 or, if appropriate human health exposure assessments to determine the nature and extent of the contamination and determine whether contaminants exceed appropriate SCGs. Samples should be taken:

i. for contaminant analysis; and

ii. to characterize sediment type, thickness of sediment layers and vertical extent of sediment.

2. Sediment sampling locations. At a minimum, sediment samples should be collected in the following locations:

i. as close as possible to discharge points, groundwater entry, erosional areas or other locations where contaminants were likely to have been released to the water body or wetland;

ii. adjacent to the border of the terrestrial portion of the site and the water body or wetland

iii. at the first most likely location of major sediment deposition, which will vary depending upon the type of water body from which the samples are collected. Samples collected from:

(1) lakes or ponds should be placed in an array moving away from the point source or site border;
(2) non-tidal streams should be placed in major depositional areas adjacent to or downstream of the site;
(3) tidal streams should be placed in major depositional areas immediately upstream, adjacent and downstream of the site; and
(4) wetlands should be placed:

(A) in an array moving away from the point source or site border;
(B) along any areas of probable flow through the wetland; and
(C) at any identifiable point where water discharges from the wetland.

iv. from any wetland or floodplain which may receive sediment from adjacent or upstream locations of potentially impacted sediment;

v. if applicable, samples should be collected at the points of entry and exit from the site if a water body crosses the site;

vi. the areas identified in paragraphs 3.8.1(a)2 and 3; or

vii. if it is necessary to evaluate human exposures to sediment in recreational areas, sampling depths, etc. for these samples will be determined in consultation with DER and NYSDOH.

3. Sampling depth for ecological assessments. Sediment samples should be collected:

i. from the 0 to 6-inch, 6 to 12-inch and 12 to 24-inch intervals, in areas where sediment depth allows;

ii. in areas of deep sediment, borings should be advanced and samples collected at regular intervals below the 24 inches identified in subparagraph i above;

iii. from distinct layers of sediments, thicker than six inches, which are identifiable by color, particle size or other physical characteristics; and

iv. from any interval where free product, NAPL or grossly contaminated media, as defined in paragraph 1.3(b)23, is identified.

4. Sediment analysis. In addition to the required chemical analyses, sediments will also be analyzed for total organic carbon to allow for the development of appropriate SCGs.

3.8.3 Sediment Background Evaluation

(a) This guidance is intended for surface water or wetland sediment background evaluations for either a SC, RI or other element of a remedial program.

1. If a suspected contaminant is identified in sediment in excess of applicable sediment SCGs, the guidance in this subsection may be followed to demonstrate to DEC that the concentration of the contaminant in the sediments is due to background conditions.

2. Area-wide sediment background studies, which are intended to be applied to more than one site, may require an expanded level of effort to be applicable. Such an expanded level of effort will be determined after consultation with DEC.

3. The purpose of a background evaluation is to allow a clear determination of the effects of site related contamination in areas where multiple sources of similar elements, chemicals, or contaminants may exist and overlap. In conducting such an evaluation, it is acceptable to include sampling in areas where other, diffuse sources of anthropogenic contamination may exist. Such sources would include atmospheric deposition or urban street runoff. Identifiable point sources, however, are not considered as background. Such sources would include SPDES outfalls, thermal discharges, or other areas of concentrated impacts.

(b) The remedial party may evaluate sediment background conditions at a site using the approaches discussed in this subdivision. This evaluation is not intended solely to develop site-specific cleanup objectives, but to assist in the characterization of site-related contamination.

1. The remedial party may use an existing DEC-approved background evaluation conducted generally in accordance with paragraph 2 below, which:

i. identified contaminant concentrations in sediment on a property near the site under investigation; and

ii. demonstrates that the sediment from the area of the background evaluation could reasonably be expected to occur at or be transported to the sediment at, or proximate to, the remedial site.

2. The remedial party may conduct a site-specific sediment background evaluation. This will include

i. evaluating whether:

(1) the contaminant(s) were used, stored or disposed on or near areas of the site proximate to the sediments in question, as documented pursuant to this guidance;
(2) there has been an impact by a discharge from the site to the sediments in question, via groundwater, erosion of soil from AOCs, subsurface NAPL migration, storm sewers, ditches or other methods of conveyance; and
(3) the distribution of the element, chemical or contaminant in the sediment follows a concentration gradient indicative of disposal or a discharge;

ii. conducting a sediment background evaluation by collecting and analyzing background surface water or wetland sediment samples from at least five background sample locations in the vicinity of the site. Samples for the background evaluation should:

(1) be collected from a depth or depths which conform to the same depths sampled during the sediment investigation conducted during the site RI;
(2). be collected at locations upstream, up gradient or otherwise outside the influence of the site and unaffected by current and/or historic site operations, as documented by the records search;
(3) not be collected from or adjacent to source areas in the site study area, including any of the following:
(A) areas where materials or wastes were loaded, handled, or stored;
(B) waste disposal areas;
(C) areas receiving runoff from areas identified in subclauses (A) or (B) above, or adjacent contaminated sites;
(D) storm drain outfalls or ditches receiving runoff from the site or adjacent contaminated sites;
(E) depositional areas within the influence of known site-related sources; or
(F) any other area of concern, as defined by section 1.8;
(4) not be collected from the following areas unless it can be demonstrated that the contamination in the area is due to generally occurring pollution related to the urban or industrial nature (anthropogenic) of the surrounding area. Samples from these locations should only be sampled in the background evaluation if similar conditions exist within the site-related area of impacts:
(A) areas near parking lots, roads, or roadsides;
(B) areas near railroad tracks;

(C) areas adjacent to historic fill material; or

(D) storm drain outfalls or ditches receiving runoff not impacted by the site or adjacent contaminated sites; and

iii. use of the same sampling and analytical methods as were used for other site samples; and

iv. in addition to identifying the background concentrations, the background evaluation should evaluate whether they are found in an area where transport to the site is likely.

3. If contaminant concentrations are found at any sampling location on the site exceeding the average concentration found in the background samples, the RI should delineate the extent of the contamination.

4. Samples collected for an investigation of an area of concern cannot be averaged for background comparisons.

(c) If a site-specific background sediment concentration identified by paragraph (b)3 above is to be proposed as a remediation level at the site, a more extensive sampling program to allow a statistical and/or chemical forensic analysis of background levels may be required.

1. The remedial party should, after consulting with DER, submit a work plan outlining the proposed methods and analyses for the additional sampling as well as the methods for any statistical and/or chemical forensic evaluation of samples.

2. In designing such an evaluation, where a grid or predetermined sample spacing is to be used, the limitations on the location of samples identified by clause (b)2.ii.(3) above are not applicable because the investigation is intended to assess the contribution of other potential sources of contaminants to the site-specific background.

3.8.4 Surface Water Background Evaluation

(a) This guidance is intended for site-specific surface water background evaluations for either a SC, RI or other element of a remedial program.

1. If a suspected contaminant is identified in surface water in excess of applicable surface water SCGs, the guidance in this subsection may be followed to demonstrate to DEC that the concentration of the element, chemical or contaminant in the surface water is due to site-specific background conditions.

2. Area-wide surface water background studies, intended to be applied to more than a one site, may require an expanded level of effort to be determined after consultation with DEC.

3. A background surface water concentration is the concentration of an element, chemical or contaminant found in the surface water body which may be attributable to:

i. an upgradient or non-point source of contamination;

ii. a permitted or unregulated discharge to the receiving surface water body; or

iii. for metals in particular, natural conditions of the surface water.

(b) If a suspected contaminant is found in excess of the applicable SCGs in surface water on, adjacent to or down-gradient of the site the collection of water samples may be considered, in accordance with this subdivision, to evaluate background conditions in the water body.

1. Two background surface water samples should be collected upstream or upgradient of the site and away from potential discharges from the site at times of low turbidity particularly if metals are a contaminant of concern.

2. Background surface water samples should be collected, preferably at the same time as the other surface water samples. If this is not possible, the samples must be collected during a period of similar turbidity conditions and flow regime as the original samples.

3. Samples should be collected as described in paragraph 3.8.3(b)2.

(c) If any RI surface water samples collected within the area that may be impacted by contaminant migration from the site exceed the background samples, a further investigation of the source of the impact should be undertaken.

3.9 Area Specific Requirements for Tanks, Storage Facilities, Water Treatment, Drainage Structures and Other Systems

(a) Storage tanks and appurtenances. The investigation of bulk storage tanks and appurtenances; should include, without limitation, all in use and out-of-service storage and associated piping, dispensers and fill ports.

1. Aboveground tanks over unpaved soil or broken pavement in contact with the soil. Sampling around tanks with shell or bottom in direct contact with soil now or in the past should meet all the following criteria:

i. a minimum of two surface soil samples should be collected to detect surface contamination around the base of each tank, in accordance with subdivision 3.5.1(b), as follows:

(1) from areas of contamination, based on soil discoloration/odors, history of repairs/replacement, soil beneath valves or low areas where spills or leaks from valves may accumulate;

(2) additional samples should be taken around larger tanks to ensure that there is at least one sample per 100 linear feet (from a depth of at least 6 inches if VOCs were stored) of tank perimeter; and

(3) unless the tank was installed and maintained in compliance with 6 NYCRR Parts 614 or 599:

(A) at least one boring should be located adjacent to or within two feet of the most down gradient tank with continuous two-foot split spoon sampling, or another DER approved comparable sampling technique, performed to four feet below the current water table, or deeper where appropriate; and

(B) the sample in each boring evidencing the highest apparent contamination based on soil discoloration, odor, field-screening result or other field indicator should be analyzed at a laboratory;

ii. if there is no evidence of soil contamination, a groundwater sample should be collected from the zero to one-foot interval below the current water table elevation. The sample should be collected within five feet of the tank on the expected downgradient side. It should then be analyzed following an appropriate laboratory method; and

iii. if there is evidence of groundwater contamination, the groundwater sample must be collected at this location.

2. Aboveground tanks elevated over unpaved soil or broken pavement. Elevated tanks where the shell or bottom is not in contact with ground:

i. require soil sampling when:

(1) there is any physical or documentary evidence of discharges;
(2) soil discoloration is observed; or
(3) field monitoring or other evidence indicates that a discharge has occurred; and

ii. at least one soil sample should be taken below tanks which store, or may have stored, contaminants that do not cause obvious soil discoloration such as VOCs:

(1) the samples should be collected in the area most likely to be contaminated, including without limitation, valve or former leak or rupture areas; or
(2) if samples cannot be obtained from below the tank because soils are not accessible to sampling equipment, the sample may be located within two feet of the tank.

3. Aboveground tanks over unbroken paved surfaces. Soil around aboveground tanks:

i. on paved surfaces or pads should be sampled pursuant to paragraph (b)1 below, if there:

(1) are stained soils adjacent to the paving or pad; or
(2) if the potential contaminant would not cause discoloration such as VOCs, if there is a history of spillage or other evidence that a discharge has occurred;

ii. within a paved containment area should be sampled at the drainage discharge point, if one exists, pursuant to subdivision (d) below (Drainage Areas);

iii. soil sampling below the pavement should be conducted when the pavement has deteriorated so as to allow potential contaminant contact with the soil, or if there is reason to believe that pavement was not present over the life of the tank or former tanks; and

iv. instead of sampling soil beneath pavement, samples around the pad may be taken pursuant to (b)1 below, subject to DER's review of documentation pursuant to subdivision 1.6(c) specifying why boring through pavement was not considered practical (for example, concrete slabs with berms, synthetic liners).

4. Underground storage tanks (USTs). USTs and distribution systems containing potential contaminants should be evaluated to identify any past or present discharges. All USTs must be in

compliance with applicable regulations, upgraded as necessary or closed in accordance with the requirements of section 5.5. All USTs not being closed should be evaluated as follows:

i. at least four soil samples should be collected from around each tank or group of tanks as noted in clause (a)3.i.(2) above. The soil samples should be collected within two feet of the tank with one sampling location located at each end, and additional sampling locations along the length of the entire tank:

(1) if sampling within two feet of the tank is not possible due to the presence of bedding gravel or there are safety considerations (e.g., danger of tank puncture) which have been identified through field investigations or review of as built plans:

(A) soil samples should be taken as close as possible to the tank, with no samples collected further than five feet from the tank or group of tanks; and

(B) a groundwater sample should be collected within five feet and down gradient of the tank or group of tanks; or

(2) when, due to safety considerations, the distance between adjacent tanks precludes locating soil samples between the tanks, a groundwater sample may be collected within five feet and down gradient of the tanks, at the appropriate depth in lieu of the required soil samples between the tanks. Where available, tank field wells may be sampled in lieu of a new well;

ii. the total number of sampling locations required per tank, or group of adjacent tanks, located within the length identified in Table 3.9 for the total tank capacity;

iii. soil samples collected for analysis should be taken at zero to two feet below the tank bottom unless the tank is within the saturated zone (see subparagraph iv below); and

iv. for underground storage tanks (USTs) within the saturated zone based on site-specific water levels:

(1) if the contents of the UST being evaluated have ever had a density less than water, a soil sample should be collected from one foot above to one foot below the current water table surface. A groundwater sample should also be collected at the appropriate depth pursuant to section 3.7. To verify tank contents for out-of-service tanks, one sample should be taken of any product or residue remaining in the tank and analyzed using an appropriate fingerprinting or other analytical method; or

(2) if the contents of the UST being evaluated have ever had a density greater than water, a soil sample should be collected from zero to two feet below the bottom of the tank. A groundwater sample should also be collected at the appropriate depth pursuant to section 3.7. To verify tank contents for out-of-service tanks, one sample should be taken of any product or residue remaining in the tank and analyzed using an appropriate fingerprinting or other analytical method; and

v. if a tank is located on bedrock, a bedrock monitoring well may be necessary.

Table 3.9 Sampling Frequency Based on Tank Capacity and/or Length [from Subparagraph 3.9(a)4.ii]		
Total Tank Capacity (Gallons)	**Approximate Tank Length (Feet)**	**Minimum Number of Samples**
56-2000	Up to 10	4
2001-10,000	Up to 30	6
10001 - 25,000	Up to 40	8
25,000+	Greater than 40	10

5. Above-grade piping. Sampling of soil beneath above-grade piping is necessary if there is evidence of a discharge (for example, discolored soil, etc.) or reports of past discharges. Any sampling conducted should be pursuant to subdivision (e) below (Discharge/Disposal Areas).

6. Below-grade piping. Below-grade piping should be evaluated to identify any past or present discharges using soil samples located zero to six inches below the piping and within two feet of the piping. Additional samples should be collected as follows, for:

i. a total piping length of 1to 15 feet, a minimum of one soil sample should be collected:

(1) an additional soil sample should be collected for each additional 20 linear feet of piping or portion thereof from 16 to 50 feet of piping length; and
(2) sample locations should be biased to include joints, dispensers and other potential discharge areas;

ii. pipe runs within two feet of another pipe run may be considered a single pipe run. Soil samples for multiple pipe lines should be collected midway between/among the lines or biased toward any pipe for which evidence of a discharge exists. For pipes that are separated by a distance greater than two feet vertically, soil samples should be collected below each pipe; or

iii. total piping lengths in excess of 50 feet, sampling frequency may be reduced subject to DER's approval of documentation pursuant to section 1.6 specifying why the reduced number was considered adequate.

7. Loading and unloading areas. For loading or unloading areas located:

i. over exposed soils which are associated with tanks, should be sampled at a minimum rate of one sample per fill connection or valved discharge point; or

ii. over impervious cover, sampling should be conducted pursuant to paragraph (b)1 below.

(b) Storage and staging areas. The investigation for all storage and staging areas, dumpsters and transformers, whether temporary or permanent, including exposed soil areas adjacent to aboveground vessels on pads; tank loading/unloading areas on pads; dumpster staging areas; electrical transformers,

heat exchanger and other outdoor equipment and drum storage pads, should also satisfy the requirements of this subdivision.

1. Pads. The investigation of a pad should:

i. have a minimum of one sampling location per side adjacent to exposed soil for sides:

(1) up to 30 feet long; or
(2) for sides greater than 30 feet long, one additional sample location is required for each additional 30 feet of length;

ii. locate each sampling point immediately adjacent to the pad and biased toward the suspected location of greatest contamination (e.g. joints);

iii. include soil samples beneath the pad, collected pursuant to subparagraph (b)2.ii below, if:

(1) the pad shows evidence of deterioration that may allow contaminant contact with the soil;
(2) the pad or its surface has been modified or repaved; or
(3) aerial photographs or site history indicate potential for previous discharges to the soil beneath the pad; and

iv. sample bermed pads and pads surrounded by impermeable cover at any drainage discharge point pursuant to subdivision (d) below (Drainage Systems).

2. Storage and staging areas over a permeable cover. Storage and staging areas with evidence of discharges which are or were used for storage of contaminants:

i. should be sampled pursuant to subdivision (e) below (Discharge and waste disposal systems);

ii. should be sampled at locations biased toward the suspected location of greatest contamination based on low points, drainage patterns, discoloration, stressed vegetation, field instrument measurements or other field indicators; and

iii. the sample frequency for these areas should be:

(1) at least one surface sample, in accordance with subdivision 3.5.1(b), per 900 square feet of surface area to characterize soils below a storage or staging area up to 300 feet in perimeter; and
(2) sample frequency may be reduced for larger areas subject to DER approval of documentation pursuant to subdivision 1.6(c) specifying why the proposed sample frequency is adequate.

(c) Surface impoundments. The investigation for all surface impoundments, including without limitation, lagoons, fire ponds, waste ponds or waste pits, storm water detention basins, excavations, natural depressions or diked areas, which are designed to hold an accumulation of liquid substances or

substances containing free liquids, should satisfy the requirements of this subdivision.

1. Sediments within any surface impoundments should be sampled if the impoundment receives runoff from areas of potential contaminant sources.

2. Sediment sample locations should be biased towards inflow/outflow areas, and areas where sediments may be expected to accumulate.

3. Core samples should be taken for contaminant analysis and to fully characterize sediment type, thickness of sediment layers and vertical extent of sediment.

4. Distinct layers of sediments thicker than six inches, as evidenced by color, particle size, or other physical characteristics, should be sampled individually.

5. Sediment quantity within the surface impoundment should be estimated.

6. Active surface impoundments with impermeable liners, which may be damaged as a result of sample collection, should have liner integrity verified by physical inspection and/or evaluation of monitoring well water quality data associated with the surface impoundment, if available.

(d) Drainage systems. The SC or RI for all drainage systems should satisfy the sampling requirements of this subdivision.

1. Floor drains and collection systems. If there is reason to believe contaminants were or may have been discharged into the floor drain or collection system:

i the point of discharge for any floor drain or collection system should be sampled if the system discharges were, or may have been, discharged to soil, groundwater or surface water;

ii. if the point of discharge is unknown, tracer tests (for example, dye or smoke) should be conducted to determine the discharge point(s);

iii. collection system integrity should be documented by representative soil sampling at potential leak areas, video inspection, hydrostatic test or pressure test. Other methods may be acceptable, subject to DER approval of documentation pursuant to subdivision 1.6 (c) specifying why the methods are effective; and

iv. sampling soil below floor drains or collection system laterals should be conducted when corrosives (if plastic piping is or was used, organic solvents are considered corrosive) are or were discharged to floor drains or the collection system or there has been a history of collection system discharges, rupture or repairs. In such cases, representative soil sampling at known or suspected leak areas is required for potential contaminants.

2. Roof leader discharge. Soil at each roof leader discharge point should be sampled if storage units or process operations using contaminants of concern vent, or may have vented, to the roof.

3. Swales and culverts. Sampling should be conducted when the swale or culvert receives or received runoff from other contaminated areas of concern:

i. sediment and soil sampling should be conducted at the points where contamination from runoff/spills enter or have entered the drainage system; and

ii. if flow could have scoured sediments from the receiving structure, sampling should be conducted at on-site down gradient structures laden with sediments.

4. Storm sewer and spill containment collection systems. Sampling should be conducted when the collection system is or was the runoff/spill discharge point from other contaminated areas of concern:

i. sediment sampling should be conducted at the manhole, catch basin, sump, or other structure where contaminated runoff or discharges enter the drainage system;

ii. sampling should be conducted in the soils around catch basins, manholes, sumps or other structures which contain or may have contained contaminants, and are not hydraulically sound (that is, water percolates through the floor and walls), through the use of adjacent soil borings:

(1) a single boring located within two feet of the downstream side of the structure should be sampled at a depth corresponding to the bottom of the structure; and

(2) if highly permeable soils are encountered and VOC sampling is required, sample at the next lower permeability soil horizon or zero to six inches above the saturated zone, or at 9.5 to 10 feet, whichever is encountered first; and

iii. groundwater discharging from storm sewer systems which contain dry weather flow (that is, five days following the most recent rainfall) should be sampled at the discharge point and analyzed for potential contaminants discharged or potentially discharged into the system.

5. Boiler and compressor discharges. For all boiler and compressor discharges if there is reason to believe that a potential contaminant discharge has occurred, sampling should be conducted pursuant to subdivision (e) below.

(e) Discharge and waste disposal systems. The SC or RI for all discharge and waste disposal systems and areas should satisfy the sampling requirements of this subdivision.

1. Discharge areas and areas of discolored soil or stressed vegetation. Where specific requirements are not otherwise provided in this section each distinct area should be evaluated independently as an area of concern:

i. initial surface soil samples, in accordance with subdivision 3.5.1(b), should be biased based on field indicators such as soil discoloration, stressed vegetation or field instrument measurements toward those areas of greatest suspected contamination;

ii. sample frequency should be at least 1 sample for every 900 square feet for areas up to 300 feet in perimeter; and

iii. sample frequency may be reduced for larger areas, subject to DER's review of documentation pursuant to subdivision 1.6 (c) specifying why the reduced sample frequency was considered adequate.

2. Aboveground treatment systems. Above ground treatment systems should be sampled pursuant to the requirements for the functional portions of the system pursuant to subdivision (a) above. For example, any aboveground waste treatment tanks over unpaved soil should be sampled pursuant to paragraph (a)1 above.

3. Below-grade wastewater treatment systems:

i. tanks, septic tanks, separators and neutralization pits:

(1) two samples, one aqueous and one sludge sample, should be collected from within the tank etc, for analysis unless documentation acceptable to DER pursuant to subdivision 1.6(c) is provided in the SCR (section 3.13) specifying why such sampling was not considered necessary to confirm that only sanitary waste was discharged to the system during the entire life of the system; and

(2) documentation, based upon diligent inquiry, should be provided to support that only sanitary waste was ever discharged to the system and that no present or former floor drains, sinks or other units in process areas were ever connected to the system;

ii. septic disposal fields:

(1) soil borings and/or test pitting should be completed as specified below for on-site disposal fields unless documentation acceptable to DER is provided as to why soil borings were not considered necessary to confirm that only sanitary waste was discharged to the system pursuant to subparagraph (e)3.i above;

(2) at least one boring or test pit per 500 square feet of field area should be completed, with a minimum of four borings per field;

(3) borings should be located within two feet of the edge of the bed area in active fields but should be angled so that samples are taken below the infiltrative surface and directly below laterals within abandoned fields;

(4) borings should be located to include the first five feet of the infiltrative surface and should be spaced so that samples are representative of the entire disposal field; and

(5) soil samples should be taken at a depth corresponding to zero to six inches below the bottom of the infiltrative surface.

iii. cesspools, seepage pits and dry wells:

(1) sampling should be conducted in accordance with clauses (2) through (5) below, unless documentation acceptable to DER, pursuant to subdivision 1.6(c), is provided in the SCR specifying why sampling was not considered necessary (e.g., to confirm that only sanitary waste or storm water was discharged to the system pursuant to subparagraph (e)3.i above);

(2) one representative sample of sludge/sediment in each pit should be obtained for laboratory analysis;

(3) a soil boring should be placed within the well, pit or pool:

(A) the soil should be cored and inspected for evidence of discharge and samples collected in accordance with paragraphs 3.2.1(c)1 and 2; or

(B) if not possible to core within the suspected structure, the boring should be placed within two feet of the downgradient side of the pit and should extend to a minimum of two feet below the pit bottom;

(4) for structures with perforated sidewalls, perforated rings, brick, block or stone construction, a boring should be placed immediately adjacent to the outside of the structure. If no other

field indicators (e.g., staining) identify a vertical zone to sample, a sample should be collected at the level of any sediment observed inside the structure;

(5) samples obtained for VOC analysis should be collected as follows:

(A) each core should be field screened with a properly calibrated photoionization detector or flame ionization detector (PID/FID) or other suitable instrument;

(B) if field measurement readings are detected above background, coring should be extended until background readings are achieved or groundwater or bedrock is encountered; and

(C) an undisturbed sample from the two-foot interval registering the highest field measurement reading should be collected and analyzed for VOCs;

(6) if the pit bottom is within two feet of the saturated zone or bedrock, a groundwater sample will be obtained within the pit or, if not possible, within two feet of the suspected downgradient side of the pit; and

(7) at a minimum, the laboratory analysis should target the contaminants suspected to have been discharged to the seepage pit.

iv. collection lines, should be sampled pursuant to paragraph (d)1 above.

3.10 Fish and Wildlife Resources Impact Analysis (FWRIA)

3.10.1 Fish and Wildlife Resources Impact Analysis Part 1: Resource Characterization

(a) The purpose of the FWRIA Part 1 is to identify actual or potential impacts to fish and wildlife resources from site contaminants of ecological concern. Refer to the document entitled *DFW&MR Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (1994)* for additional guidance and detail on how to conduct a FWRIA.

(b) When paragraphs 1 through 4 below apply at a site, it is assumed no FWRIA is needed.

1. The remediation is directed toward a specific discharge or spill event that does not adversely impact fish and wildlife resources.

2. The AOCs at the site consist solely of an underground storage tank(s) or an underground tank system, with no significant impact on surrounding groundwater or surface water.

3. The site is a point source of contamination to the groundwater (i.e. dry cleaner or gas station) which will be prevented from discharging to surface water, and there is no widespread soil contamination or habitat of an endangered, threatened or special concern species present.

4. There are no ecological resources present on or in the vicinity of the site, determined pursuant to paragraph (c)1 below (e.g. an urban site which is not proximate to a surface water body, wetland or other ecologically significant area).

(c) A resource characterization consists of the five steps detailed below and should be conducted by an individual with the qualifications set forth at subparagraph 1.5(a)3.ii in accordance with the RI work plan. These steps will also satisfy the ecological portion of the qualitative exposure assessment for the BCP, while for CERCLA and NPL sites, a USEPA Ecological Risk Assessment may also be required.

1. Identify all fish and wildlife resources based upon knowledge of the site and a search of DEC records and/or other sources. If no resources are identified on the site, adjacent to or down gradient from the site and the lack of resources is not due to contamination, no further work on the FWRIA is required. Any resources identified should be indicated on a site map. The base map may be derived from such sources as aerial photos, ground-level photos, USGS topographic maps or soils maps. Maps should be drawn to a scale that allows features to be easily discerned. The following site maps should be provided:

i. a topographic map showing any fish and wildlife resources within one-half mile of the site including, but not limited to:

(1) habitats supporting rare, threatened and endangered species;
(2) NYS regulated wetlands;
(3) waterways including all classified waters;
(4) wild, scenic and recreational rivers;
(5) significant coastal fish and wildlife habitats, streams and lakes; and
(6) state forests, forest or nature preserves, parks, or other designated open or green spaces; and

ii. a general cover type map for the area within one-half mile of the site showing any:

(1) terrestrial, marine or freshwater habitat, such as woodlands, fields, wetlands (tidal, freshwater),shellfish beds, weed beds or NYS significant habitats; and
(2) any rare NYS ecological communities.

2. Describe the resources on the site and within one-quarter mile of the site. Much of the information required for the description of resources may be based upon existing knowledge of the site and a search of DEC records or other sources. Field verification may be needed if the site is large or contains extensive resources. If resources that may be affected by site-related contaminants exist farther than one-half mile from the site, this information should also be provided. The description of the resources should include:

i. a description of cover types, typical vegetative species, rare or protected plants

ii. DEC freshwater wetlands and stream classifications, and tidal wetland types;

iii. typical fish and wildlife species to be expected for each cover type and endangered, threatened, rare species or species of special concern;

iv. observations of stress including leachate or other seeps, exposed waste, absence of biota and dead or dying vegetation;

v. recorded fish kills or other instances of wildlife mortality associated with the site;

vi. existing fish or wildlife consumption advisories;

vii. a qualitative assessment of the general ability of the area to support fish and wildlife or act as corridors for fish and wildlife movement; and

viii. the current and potential use of the resource by humans for hunting, fishing, wildlife observation, scientific research and other recreational or economic activities.

3. Identify contaminant migration pathways and any fish and wildlife exposure pathways. Fish and wildlife exposure pathways are considered:

i. complete pathways in all instances where contaminants are potentially available for exposure to fish and wildlife resources regardless of the total extent of the contaminant exposure area or number of individuals exposed. Where complete pathways are identified:

(1) they should be included in the conceptual site model described in subdivision 3.2.2 (a); and

(2) any site or near-site features that could act as exposure pathways on or off the site, such as drainage ditches, lagoons, outfalls and seeps, should be included on the site maps; or

ii. incomplete pathways, if no exposure pathways are present. Where no complete pathways are identified, no further work on the FWRIA is needed.

4. Identify contaminants of ecological concern. Contaminants of potential ecological concern are:

i. those contaminants that have been identified by the investigation as having been discharged or disposed at a site, which have been determined to exist in areas of identified fish and wildlife resources at concentrations that are known to:

(1) bioaccumulate or biomagnify in the aquatic, marine or terrestrial food chain;
(2) result in toxic effects in biota; and/or
(3) potentially contribute to the need for a health advisory for the consumption of fish or wildlife; and

ii. identified at a site by:

(1) comparing site contaminants to SCGs for the protection of biota in each medium of concern (surface water, sediments, soil or biota); or

(2) if such SCGs do not exist, criteria should be derived using methods established in SCGs (e.g., 6 NYCRR Part 706 for surface water) and/or by a toxicity assessment. A toxicity assessment should:

(A) be conducted using applicable state or federal guidance;
(B) be based on available scientific literature; and
(C) compare levels of site contaminants to the reference toxicity values developed; and

iii. are considered to be present at a site when the contaminant concentrations exceed the applicable SCGs or the developed reference toxicity values, identified by subparagraph ii above.

5. Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern, the FWRIA Part 1 should draw conclusions regarding the actual or potential adverse impacts to fish and wildlife resources.

(d) All documentation and results of a FWRIA Part 1 should be submitted to DEC. The remedial party may elect to submit a work plan for a FWRIA Part 2 consistent with subdivision 3.10.2 (c), with this data submission.

1. Based on the information provided by the FWRIA Part 1data submission, DEC will:

i. determine whether the fish and wildlife resources identified constitute an important component of the environment at or in the vicinity of the site; and

ii. whether there are actual or potential impacts to the resources.

2. For sites where further evaluation or definition of ecological impact is necessary, DEC will identify the need for a FWRIA Part 2 ecological impact assessment, and request a work plan which includes provisions for gathering the necessary data identified in subsection 3.10.2 to define and evaluate the adverse impacts to the resources.

3.10.2 Fish and Wildlife Resources Impact Analysis Part 2: Ecological Impact Assessment

(a) The remedial party should complete a FWRIA resource characterization (Part 1) according to subsection 3.10.1 before proceeding with this section. If the results of the resource characterization indicate that further assessment is needed, an ecological impact assessment (Part 2) is required to further define and evaluate the adverse impacts to fish and wildlife resources.

(b) The ecological impact assessment should follow applicable State and federal guidance or scientific literature and should be conducted pursuant to a DEC-approved work plan by a person with the qualifications set forth at subparagraph 1.5(a)3.ii.

(c) Additional data collection needed to complete the ecological impact assessment should be identified in a work plan prepared by the remedial party. As appropriate for the contaminated media and contaminants of ecological concern identified by the FWRIA resource characterization, the work plan should detail the collection of additional data as set forth in this subdivision.

1. Additional soil, sediment and/or surface water sampling to further delineate or characterize the contaminants of ecological concern identified in paragraph 3.10.1(c)4.

2. Use of passive in-situ concentration/extraction samplers (PISCES) to identify sources of organochlorine compounds with extremely low solubility in surface water.

3. Toxicity testing or bioassays of contaminated soils, sediments or surface water according to the latest EPA, ASTM or other approved methods for assessing acute and chronic effects.

4. Biota tissue sampling and analysis.

5. Terrestrial, aquatic or marine population and/or community assessment.

6. Ecological assessments or other evaluations as requested by DEC.

(d) Using the results of paragraphs (c)1 through 6 above, the remedial party should conduct a detailed toxicity assessment incorporating information from subsection 3.10.1 and describe the actual or

potential adverse impacts to fish and wildlife resources from the site.

1. The results of the FWRIA should be reported as a separate section of the remedial investigation report.

2. The FWRIA section should:

i. summarize the information and findings of the FWRIA parts 1 and 2;

ii. develop appropriate ecologically based, site-specific cleanup objectives for site contaminants of ecological concern; and

iii. recommend measures for incorporation into the remedy selection report to eliminate or mitigate actual and potential adverse impacts.

3.11 Historic Fill Material

(a) If historic fill material (HFM) is identified at a site during development of the RI work plan or in the course of the soil investigation being undertaken pursuant to subsection 3.5.2, the additional steps outlined in this section may be applicable to characterize the HFM.

(b) The RI of HFM is intended to identify the location and extent of the historic fill on and around the site, as well as to characterize the nature of the fill material, including a determination of the presence of any contaminated non-HFM and any free product and/or NAPLs as defined in section 1.3.

1. The RI of HFM should be conducted to identify the location, vertical limits, and physical characteristics of the HFM using borings, test pits, trenches and/or appropriate geophysical techniques. The investigation should include:

i. the logging and mapping of all contaminated fill material encountered, including both historic and non-historic fill;

ii. at least four borings or test pits per acre of HFM with a minimum of four borings or test pits. The location of the borings or test pits should be representative of the areal extent of the fill and should be advanced through the fill material to native soil, meadow mat or bedrock so that the vertical limit of the fill material is established; and

iii. if the contaminated fill material extends below the water table, borings or test pits should extend below the water table as necessary to establish the vertical limit of the fill material;

2. The RI of HFM should identify the horizontal boundaries of the contaminated fill material area as follows:

i. a minimum of four borings or test pits should be installed in non-fill areas spaced equidistantly around the perimeter of the contaminated fill material area;

ii. if fill material is known to be ubiquitous in the vicinity of the site, aerial photos or other applicable documentation may be submitted in lieu of perimeter borings or test pits to verify that historic fill is site-wide; and

iii. delineation of HFM is not required beyond the property boundary; however this should not be construed to limit the necessary delineation of any off-site contamination due to migration from the site.

3. The HFM may be characterized by collecting and analyzing contaminant characterization samples from each type of historic fill present (e.g. ash and demolition debris are considered to be different types of fill material) to determine the site-specific contaminant levels, as follows:

i. at least four samples per acre, per fill type are required;

ii. the actual number and location of samples collected should be based on the variability of fill types and contaminant ranges present in a historic fill area and selected in accordance with section 3.2; and

iii. at least one sample for laboratory analysis should be collected from each boring and analyzed as follows:

(1) analysis of rubble, ash, cinders and dredge spoils should be conducted for:

(A) total petroleum hydrocarbons;

(B) priority pollutant metals in all samples;

(C) carcinogenic and noncarcinogenic polycyclic aromatic hydrocarbons (per EPA Priority Pollutant List); and

(D) PCBs on 25 percent of the samples, biased to samples having the highest total petroleum hydrocarbon levels;

(2) field screening for VOCs should be conducted during the installation of all exploratory borings and test pits with volatile organic laboratory analysis performed on all samples with elevated field instrument measurements (greater than five times background);

(3) any other fill material should be analyzed for total petroleum hydrocarbon in all samples, and Priority Pollutant plus 40 analysis or EPA Target Compound List/Target Analyte List analysis should be conducted for 25 percent of all samples;

(4) in addition to the contaminant analysis required in clauses (b)3.iii.(1) and (2) above, samples should also be analyzed for any other suspected contaminants based on diligent inquiry of the origin of the fill material and site history; and

(5) if more than one type of HFM is encountered in any boring or test pit, one sample is required for each type of fill material encountered. For example, if ash and demolition debris are encountered in the same boring, one sample of each is required from that boring.

4. Areas of concern, as defined in section 1.8, located in HFM should be investigated independently of the HFM. To differentiate between contaminants in fill and those from site discharges, an evaluation of the contaminant type and concentration gradient in each area of concern and the contaminant distribution in the fill should be conducted. If this evaluation is not conclusive DER may require additional data or information.

5. If the remedial party encounters materials that do not meet the definition of HFM because it includes material which meets the definition of a source in paragraph 1.3(b)70, drums or other containerized waste, the remediation of each such area should be conducted as(a) separate area(s) of concern.

6. An appropriate number of groundwater samples (minimum of one sample) are needed to

document that ground water is not contaminated, including, without limitation, if the historic fill site is in an area where groundwater is used for potable water. Any ground water sampling should be consistent with the requirements of section 3.7.

3.12 Records Search Report

(a) If no areas of concern are identified which require characterization or RI, the remedial party is to prepare a records search report which meets the requirements of this subdivision.

1. The records search report should:

i. present and discuss all of the information identified, evaluated or collected pursuant to subparagraph 3.1(a)1.i;

ii. be presented in a format that corresponds to the outline of Appendix 3A; and

iii. include the following:

(1) scaled site plans detailing lot and block numbers, property and leasehold boundaries, construction or destruction of buildings, areas where fill or cover material has been brought on-site, paved and unpaved areas, vegetated and unvegetated areas, all areas of concern and active and inactive wells; and

(2) scaled historical site plans and facility as-built construction drawings, if available;

(3) a copy of the United States Geologic Survey (USGS) 7.5-minute topographic quadrangle that includes the site and an area of at least a one-mile radius around the site. This map should be the most recent USGS revision and should clearly note the facility location and property boundaries. When a portion of the USGS quadrangle is used, the scale, north arrow, contour interval, longitude and latitude and the name and date of the USGS quadrangle must be noted on the map; and

(4) a summary of the data and information evaluated in all phases of the work, as set forth in Appendix 3A, should be presented by area of concern.

2. For each area of concern identified at the site, which has not been remediated under DER oversight, the records search report should contain a recommendation that either:

i. one or more contaminants have been identified at the area of concern or are suspected of being present, the area of concern has not been previously remediated under DER oversight indicating additional investigation or remediation is required; or

ii. the area of concern is not believed to contain contaminants, pursuant to subdivision 3.1(a), in which case the records search report should detail the basis for the recommendation including references to all documentation relied upon in making the recommendation.

(b) If areas of concern are identified which require further characterization or a RI, a separate records search report need not be prepared. The information obtained in the records search, should be incorporated into the SCR described in section 3.13 or the RI report described in section 3.14.

(c) Upon written request of the remedial party DER will determine the extent to which prior submissions or completions may satisfy the specific items required for the records search report. If DER

approves any such prior work, that work may be included as part of the records search report.

(d) Electronic submissions. The remedial party is to provide the records search report, prepared in accordance with section 1.15, as a stand-alone submission unless otherwise approved in a work plan.

3.13 Site Characterization Report

(a) The site characterization report (SCR) should be prepared in accordance with this subdivision, where the SC concludes that a RI is not required for the site, or the remedial party will not proceed with the RI of the site. The SCR should present and discuss all of the information identified or collected pursuant to subsections 3.2.1, 3.4,3.5.1, 3.6, 3.7.1 and 3.8.1.

(b) A full SCR is not required if the remedial party or DER determines that a RI is necessary, in accordance with subdivision 3.1(b), or if one is planned by the remedial party.

1. When the remedial party elects to transition the SC to a RI the information identified by:

i. subdivisions (e) and (f) below, should be incorporated into either:

(1) the RI work plan; or
(2) submitted as a site characterization investigation data summary, as described in paragraph 2 below; and

ii. the discussion in subdivision (d) below should be included in the remedial investigation report.

2. Site characterization investigation data summary. If the SC determines that a RI is necessary, the remedial party may proceed directly to this level of investigation and the SCR may be limited to a summary of the following:

i. the information identified in:

(1) paragraphs (d)2 and 4;
(2) subdivision (e); and
(3) in the stand alone electronic data summary, any applicable data identified for inclusion in subdivision (c) below; and

ii. a scope of work for the RI, consistent with subdivision 3.1(c), which will be the basis for a development of the RI work plan pursuant to section 3.3 may be included in the summary.

(c) Electronic data summary (EDS). The SCR is not to include, either as an appendix or an attachment, any of the information identified in paragraphs 1 through 5 below. The remedial party is to provide this information, in accordance with section 1.15, as a stand-alone data submission unless otherwise approved. The EDS is to include the information identified by this subdivision. An EDS will be included in accordance with this guidance for all other report or document submissions which include similar data.

1. Results of all analyses;

2. Copies of all validated laboratory data sheets;

3. Required laboratory data deliverables pursuant to sections 2.2 and 2.3 and Appendix 2B;

4. Well development logs and, if applicable, well as-built specifications. The following information, where applicable, should be reported for each monitoring well sampled for each groundwater sampling event:

i. before purging, the:

(1) date, time and weather conditions;
(2) well identification number;
(3) photoionization detector (PID) and/or flame ionization detector (FID) reading taken from the well immediately after the cap is removed;
(4) thickness of NAPL, if present;
(5) pH, dissolved oxygen, temperature and specific conductance;
(6) total depth of the well from the top of casing or surveyors mark if present;
(7) depth from the top of the casing to the water; and
(8) estimated water volume in the well;

ii. after purging, the:

(1) start and end time for purging;
(2) purge method;
(3) purge rate(s);
(4) total volume purged;
(5) depth from the top of the casing to the water after purging; and
(6) pH, dissolved oxygen, temperature, turbidity and specific conductance;

iii. before sampling, the depth from the top of the casing to the water prior to sampling; and

iv. after sampling, the:

(1) start and end time for sampling;
(2) sampling method; and
(3) pH, dissolved oxygen, temperature, turbidity and specific conductance.

v. any comments concerning field observations during the groundwater sampling event, such as slow recharge, turbidity, odor, sheen, PID and/or FID readings, model number and ionization potential of PID and/or FID used, should also be reported; and

vi. all measurements should be to the nearest 0.01 feet.; and

5. All supporting information typically provided in the records search report detailed in section 3.12, if this report is combined with the SCR. If a separate records search report was provided this should not be included in the SC report but remain a standalone document, summarized in the SC report.

(d) When a SCR is prepared it should document the findings of the records search and the site setting in accordance with this subdivision.

1. Historical information pursuant to section 3.12 should be reported, unless:

i. the investigation is directed at either a specific discharge event rather than a particular area of a site, or any underground tank or underground tank system; or

ii. a site history report has already been prepared.

2. Unless the remedial program is directed at a specific discharge event, rather than a particular area of concern or any underground tank or underground tank system, a physical setting section should include descriptions of the:

i. physical conditions of the site and surroundings, including a general description of soils, geology, hydrogeology and topography;

ii. use of, distance to, flow direction, classification of and names of surface water bodies within one-half mile of the site with emphasis upon water bodies topographically or hydraulically down gradient of the site that may receive site discharges or runoff; and

iii. presence of any public/private potable water, irrigation or process water wells within one-half mile.

3. A technical overview which should present a general profile of the SC results. The following items should be discussed in the technical overview:

i. reliability of laboratory analytical data as indicated by compliance with sample holding times, ability to achieve method detection limit or minimum reporting limits and precision and accuracy criteria for the analytical method, and other indicators of data quality;

ii. a summary of the general nature of contamination on the site to the extent investigated by the SC including, without limitation, the numbers of areas of concern requiring further investigation and/or remediation; and

iii. any significant events or seasonal variation which may have influenced sampling procedures or analytical results.

4. Findings/recommendations which should include, by area of concern, a summary of the following items:

i. any changes in sampling protocols, locations, etc. due to field conditions, from that set forth in the work plan;

ii. a description of each area of concern identified, including dimensions, suspected and actual contamination and suspected source of discharge or disposal;

iii. recommendations for either additional investigation in the RI, remediation or no further action for each area of concern; and

iv. all available results of the FWRIA.

(e) The SCR should present the data and information gathered by the characterization scope of work in accordance with this subdivision.

1. A summary table of analytical methods and quality assurance indicators pursuant to section 2.2 as an appendix to the SCR.

2. A table summarizing all sampling results, including sample location, media, sample depth, field and laboratory identification numbers, analytical results and comparison to applicable SCGs, for the media in question, organized by area of concern:

i. all contaminant concentrations exceeding the applicable media-specific SCGs should be identified in accordance with paragraph 2.2(b)1;

ii. samples with detection limit or minimum reporting limits (MDLs) exceeding the applicable remediation standard should be identified and an explanation provided in the table key;

iii. soils/solids sample results should be reported in milligrams per kilogram on a dry-weight basis, and aqueous sample results should be reported in micrograms per liter;

iv. all groundwater data for the same aquifer zone should be located in the same section of the table; and

v. a table which identifies all contaminants of ecological concern, applicable SCGs, any reference toxicity values developed during the toxicity assessment and representative concentrations of those contaminants at the site.

3. Stratigraphic logs, which include soil/rock physical characteristics and field instrument readings detected during drilling for each soil boring, test pit and monitoring well. If sediment sampling was conducted, logs which describe grain size, color, cohesion, odor and stratigraphy, if evident, should be included.

4. Stratigraphic cross sections of the site using information from monitoring wells, test pits and borings, as well as public/private drinking water well information, if available.

5. All soil boring, piezometer and monitoring well logs.

6. Any other data and information relevant to the nature and extent of contamination obtained pursuant to subsections 3.2.1, 3.5.1, 3.7.1 and 3.8.1.

(f) The SCR should include legible maps and diagrams in accordance with this subdivision.

1. Site and area of concern base maps pursuant to subparagraph 3.12(a)1.iii should be scaled at one inch to 200 feet or less (sample location maps may be keyed to and superimposed on base maps) and consistent with the specifications for maps and diagrams in accordance with this subdivision.

2. Sample location map(s), including:

i. all sample locations, sample depths and contaminant concentrations should also be plotted on the map. Where an entire contaminant class is not detected or is less than the applicable SCG, contaminants need not be listed individually;

ii. map scale and orientation;

iii. field identification numbers for all samples; and

iv. if more than one map is submitted in paragraph(d)1 above, the maps should be presented as overlays, keyed to the base map with sample locations superimposed on the site or area of concern map. Alternatively, individual maps may be submitted which have a common coordinate system and common scale, provided each map details the features of the base map.

3. If applicable, a map of the distribution of surface water, sediment, structure and airborne contaminants, including sample location numbers and contaminant concentrations.

4. Photos may be submitted to document the location of all soil and sediment sample locations.

(g) Electronic submissions. All required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

3.14 Remedial Investigation Report

(a) The remedial investigation report (RIR) incorporates the information collected by the investigations conducted pursuant to sections 3.1 through 3.11 by all approved RI work plans, addenda or supplements. Where the RI was conducted in several phases, the RIR is to be a comprehensive report of all data collected during the RI and the conclusions drawn from that data. The RIR is to provide the information identified by this subdivision and should use available RIR template(s) provided on DEC's website identified in the table of contents, as directed by the DER project manager.

1. Identify and characterize the source(s) of contamination.

2. Describe the amount, concentration, environmental fate and transport, including as necessary, phase (e.g., gas, solid, liquid), location, and other significant characteristics of the contaminant(s) present.

3. Define hydrogeological factors, as needed, to include: grain size analysis, soil permeability, nature of any bedrock, depth to saturated zone, hydraulic gradients, depth to bedrock, bedrock permeability, proximity to a drinking water aquifer, surface water, floodplains and wetlands.

4. Provide a qualitative human exposure assessment, in accordance with paragraph (c)17 below.

5. Identify actual or potential adverse impacts to fish and wildlife resources and to other environmental resources (mining, recreational etc.).

6. If present, identify surface water classifications and existing use designations.

(b) Electronic data summary (ESD). The RIR must not include, either as an appendix or an attachment, any of the information identified in paragraphs 1 through 4 below. The remedial party is to provide this information as set forth in paragraph (c)20 below as a stand-alone submission, unless otherwise approved by DER.

1. All data identified in subdivision 3.13(c).

2. Records Search report, site history or SCRs.

3. RI work plan.

4. Copies of any laboratory data sheets and the required laboratory data deliverable documentation pursuant to sections 2.2 and 2.3 and Appendix 2B.

(c) The RIR should build upon the information obtained by the SC (if one was performed for the site) and report specifically on the items identified by this subdivision as well as any site-specific data gathered pursuant to the RI work plan.

1. All of the relevant information obtained pursuant to paragraphs 3.3(b)1 and 2 should be reported.

2. Provide a technical overview and findings along with a description of the work completed under the approved RI work plan and the results of that completed work. The technical overview and findings should include:

i. the results of the DUSR;

ii. a summary of the overall nature and extent of contamination using the state standards, criteria, and guidance identified in subdivision 3.2.2(e). for comparison;

iii. a summary of any ecological assessments conducted in accordance with section 3.10; and

iv. any significant events, observations or seasonal variation which may have influenced sampling procedures or analytical results.

3. SCGs which pertain to the site location and site contaminants as well as potential remedial action objectives must be identified and listed in the RIR. The RI should determine the extent to which the unrestricted use SCGs have been exceeded or contravened. In addition, the remedial party may evaluate the extent to which the use-base SCGs under consideration for the site have been exceeded or contravened.

4. All sampling results which exceed unrestricted soil SCGs, the groundwater standards or other applicable unrestricted SCGs should be summarized in tables (organized by areas of concern) which include sample location, media sampled, sample depth, field/laboratory identification numbers, analytical results and the applicable unrestricted SCG for comparison. The results of any QA/QC samples analyzed should also be included. Universal Transverse Mercator (UTM) coordinates (North American Datum [NAD] 83) should be identified for each sample location; appropriate GPS accuracy is

acceptable.

5. Stratigraphic logs which include soil/rock physical descriptions, well installation details, well development data including volumes purged, and field instrument readings detected during drilling for each soil boring, test pit and monitoring well. This data, where available, for any public/private drinking water wells in the area of groundwater impact should also be included.

6. If sufficient subsurface investigation was completed, stratigraphic cross sections of the site using information from monitoring wells, test pits, borings, geophysical data, or other historical information.

7. Site and area of concern base maps scaled at one inch to 200 feet or less (sample location maps may be keyed to and superimposed on base maps) and consistent with the specifications for maps and diagrams included in subdivision 3.13(f).

8. Sample location maps, appropriate to the area of the site and consistently used, with the sample points located by a surveyor or by GPS to include all groundwater, soil, sediments and other sample locations with sample depth and contaminant concentrations indicated on the map, if possible.

9. Groundwater elevation contour maps with flow direction specified for each set of static water level measurements for each aquifer where monitoring wells/piezometers were installed for flow direction. Groundwater elevation, for each monitoring well/piezometer, must be to the nearest hundredth (0.01) foot relative to a permanent, on-site datum.

10. Top of bedrock contour or low-permeability unit (e.g., aquitard, clay or aquiclude) map if bedrock or the unit was encountered in a sufficient number of borings to prepare a map.

11. At a minimum, site maps should show groundwater contaminant concentrations for each sampling round. Isopleth maps for groundwater contaminant concentrations for each round of sampling and isopleth maps for soil sample results should also be provided.

12. Maps depicting the areal and vertical (thickness) extent of any NAPL zones in groundwater or soil.

13. If completed during the investigation, results of any treatability, bench scale or pilot studies or other data collected to support remedy selection. This would include documentation acceptable to DER indicating that a groundwater model used to evaluate potential groundwater remedies was appropriate. The study and supporting documentation should be provided as part of the EDS identified in subdivision (b) above or as a stand-alone document, not as an appendix to the RIR.

14. Any data collected to develop discharge limitations.

15. A section of the RI should present the results of the Fish and Wildlife Resources Impact Analysis documenting the results of the Resource Characterization and Ecological Impact Assessment or fish and wildlife exposure assessment consistent with section 3.10, if required.

16. Any other pertinent data obtained from implementing the work plan, including any IRMs done prior to or during the RI.

17. A qualitative human health exposure assessment completed in accordance with paragraph 3.3(c)4 and Appendix 3B, which identifies areas of concern and chemicals of concern, evaluates actual or potential exposure pathways, characterizes the potentially exposed receptors (residents, workers, recreational users, etc.), and identifies how any unacceptable exposures might be eliminated/mitigated. An exposure assessment should identify:

i. exposure pathways, which is how an individual may come into contact with a contaminant. The five elements of an exposure pathway are the:

(1) source of contamination;
(2) environmental media and transport mechanisms;
(3) point of exposure;
(4) route of exposure; and
(5) receptor population;

ii. the elements of an exposure pathway identified in subparagraph i above, are based on past, present or future events; and

iii. the potentially exposed receptors and how any unacceptable exposures may be eliminated are determined from an assessment of the primary use of the area (e.g., residential, industrial, or recreational), actual and potential use of ground and surface waters that are impacted or threatened, and how any potential routes of exposure may be eliminated. The current, proposed or reasonably anticipated future use of the area should be used in this assessment.

18. A quantitative risk assessment consistent with CERCLA may be requested by DER, based upon the exposure assessment, described in paragraph 17 above, unless the remedial program is undertaken by volunteer in the BCP.

19. Conclusions and recommendations which summarize the extent of the areas of concern, identifies any unacceptable exposure pathways, and recommends any future work (e.g., none, additional investigation, or an evaluation of remedial alternatives). This should include an updated conceptual model of the site and may also include remedial action objectives selected from those provided on the DEC website identified in the table of contents.

20. Electronic submissions. All required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

This Page Intentionally Left Blank

CHAPTER 4 REMEDY SELECTION

4.1 Remedial Goals, Objectives and Factors to Consider

(a) The purpose of remedy selection is to identify, evaluate and select a remedy or alternative remedies to address the contamination identified by the RI of the site or an operable unit of a site.

(b) Remedial goals. The statutory or regulatory remedial action goals for remedial actions undertaken pursuant to this guidance are set forth in the applicable regulations identified in section 1.2.

(c) Remedial Action Objectives (RAOs). RAOs are medium or operable unit-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific SCGs to address contamination identified at a site. Where applicable, the generic RAOs identified on the DEC website identified in the table of contents are to be used for the various media.

1. RAOs are established for the remedy selection process:

i. from the generic RAOs identified, as applicable to the contaminants identified by the RI; or

.

ii. by developing a site-specific RAO, where the generic RAOs provided on the DEC website do not address a unique site condition. Such RAOs may be proposed by the remedial party or required by DER.

2. The following must be identified and considered when establishing RAOs:

i. applicable SCGs, considering the current, intended and reasonably anticipated future use of the site and its surroundings [see subdivision 4.2(i)];

ii. all contaminants exceeding applicable SCGs;

iii. environmental media impacted by such contaminants;

iv. extent of the impact to the environmental media;

v. all actual or potential human exposures and/or environmental impacts resulting from the contaminants in environmental media identified in subparagraph iii above; and

vi. any site-specific cleanup levels developed pursuant to subparagraph 3.10.2(d)2.ii or paragraph 3.14(c)18.

(d) Baseline considerations. The remedial party will evaluate the following baseline considerations, unless they are not applicable to the site conditions, when developing alternatives in accordance with section 4.3. These baseline considerations are applicable without regard to the use of the site.

1. Protection of public health and the environment. All remedial alternatives developed must eliminate or mitigate threats to public health and the environment presented by the contaminants through the proper application of scientific and engineering principles. Notwithstanding, a

no action alternative; or where (an) IRM(s) has/have been implemented, a no further action alternative is also to be developed for a state superfund, federal superfund or ERP site regardless of protectiveness

2. Sources of contamination. An identifiable source of contamination shall be addressed by the remedial program in accordance with the following hierarchy of preference:

i. removal and/or treatment - All free product, concentrated solid or semi-solid hazardous substances, dense non-aqueous phase liquid, light non-aqueous phase liquid and/or grossly contaminated media should be removed and/or treated. If the removal and/or treatment of all such contamination is determined not to be feasible, such contamination shall be removed or treated to the greatest extent feasible;

ii. containment - Any source remaining following removal and/or treatment in accordance with subparagraph i above should be contained. If full containment is determined not to be feasible, the remedy should provide containment to the greatest extent feasible;

iii. elimination of exposure - Exposure to any source remaining following removal, treatment and/or containment should be eliminated through additional measures, including but not limited to, provision of alternative water supplies and the elimination of vaporization into buildings. If such elimination is not feasible such exposure shall be eliminated to the greatest extent feasible; or

iv. treatment of source at the point of exposure - Treatment of the exposure resulting from sources of contamination at the point of exposure, including but not limited to, wellhead treatment or the management of volatile contamination within buildings, may be considered as a last resort.

3. Bulk storage tanks and containment vessels. Where petroleum or chemical storage tanks, subject to the applicable DEC bulk storage regulations, are discovered on site during the course of the remedial program or any product or contaminant is found to be stored on the site in containment vessels other than storage tanks (such as drums, transformers, sumps and pits), the remedy for the site will include provision to:

i. all known tanks on the site, which are under the ownership or control of the remedial party, shall be registered in accordance with the applicable statutory and regulatory requirements, as follows;

(1) petroleum bulk storage, as set forth in 6 NYCRR Part 612; or
(2) chemical bulk storage, as set forth in 6 NYCRR Part 596;

ii. all such known tanks that are out of service or out of compliance and which are under the ownership or control of the remedial party, shall be closed in accordance with the applicable statutory and regulatory requirements, as follows:

(1) petroleum storage tanks, as set forth in 6 NYCRR Part 613; or
(2) chemical storage tanks, as set forth in 6 NYCRR Part 598; and

iii. where such tanks or vessels identified in paragraph ii above are out of service or out of compliance and they contain any product or contaminants, such product or contaminants shall be removed and disposed of in accordance with all applicable state and federal requirements:

(1) as an IRM in accordance with section 1.11; or

(2) if DER has not required expedited action as an IRM, will be addressed by the alternatives developed for the site.

4. Groundwater protection and control measures. All remedial programs will consider the protection of groundwater in the development and evaluation of remedial alternatives and will consider DEC guidance including, any groundwater remediation strategy issued pursuant to ECL 15-3109. While the current use of groundwater as drinking water may be considered, the absence of such use shall not exclude the need for remediation Where the RI has identified groundwater contamination as set forth below, the remedial program must consider measures to address:

i. any source of on-site groundwater contamination which was identified at the site. In doing so the remedy selection must consider:

(1) source removal or control as set forth in paragraph 2 above;

(2) groundwater quality restoration by evaluating the feasibility of measures to restore groundwater quality to meet applicable SCGs; and

(3) plume containment/stabilization to prevent, to the extent feasible, the further migration of groundwater plumes whether on or off site, by developing and evaluating the feasibility of remedial alternatives that can achieve groundwater plume containment/stabilization. Note however, a volunteer in the Brownfield or Voluntary Cleanup programs is only required to evaluate the feasibility of containing the plume on-site.

ii. on-site groundwater contamination which may be attributed to both an on-site and an off-site source, where there is off-site migration of groundwater contamination. In doing so the remedy selection must:

(1) identify a remedy for the site which includes removal, containment or treatment of the on-site sources contributing to the groundwater contamination, as set forth in paragraph 2 above; and

(2) develop and evaluate remedial alternatives which eliminate or mitigate on-site environmental impacts or human exposures, to the extent feasible, resulting from any off-site contamination entering the site.

iii. off-site source of groundwater contamination with no on-site source (or contribution):

(1) the on-site groundwater contamination may be attributed to an off-site source if DER determines that:

(A) no act of the remedial party has contributed to the upgradient contamination, or caused such contamination to become worse;

(B) one or more off-site source(s) of contamination, located on one or more upgradient locations, are impacting on-site groundwater as a result of the migration of the contaminated groundwater to the site; and

(C) no on-site source(s) may have caused, or may be causing or contributing more than inconsequential amounts to the groundwater contamination; and

(2) where DER has determined that the criteria in clause (1) above have been satisfied, the remedial party will:

(A) except as provided in subclause (B) below, have no remedial

responsibilities with respect to such groundwater contamination migrating under the site; and

(B) develop and evaluate remedial alternatives which eliminate or mitigate on-site environmental impacts or human exposures, to the extent feasible, resulting from the off-site contamination entering the site; and

iv. the impact of contaminated groundwater discharging to surface water on surface water quality.

(e) Other considerations for soil contamination. The remedial party will address the considerations and media identified by this subdivision, where applicable to the site conditions identified by the RI, in each of the alternatives developed for evaluation and analysis in accordance with section 4.3. These considerations, where applicable, will be considered without regard to the use of the site.

1. Soil vapor and soil vapor intrusion. Where soil vapor contamination is identified by the RI, the development of remedial alternatives shall address, as set forth at 6 NYCRR 375-6.7(a) the contamination in this environmental medium, as well as, the migration of contaminants in soil and groundwater at levels which have the potential to impact the indoor air of buildings or areas where buildings are likely to be constructed, resulting in actual or potential human exposures. The remedy selection process is to consider whether the remaining contamination will or may have the potential to impact soil vapor or result in the need to take actions to address exposures related to soil vapor intrusion, the site-specific remedy will evaluate measures in addition to addressing the source pursuant to subdivision (d) above, to address soil vapor intrusion through:

i. additional remedial actions to address soil contamination;

ii. additional remedial actions to address contaminated groundwater. The consideration of additional remedial actions to treat on-site groundwater is necessary because the exemption to the general applicability of the protection of groundwater soil SCGs, set forth at 6 NYCRR 375-6.5(a)1, is not applicable in this instance;

.

iii. engineering controls to address environmental or building factors (e.g. new slab);

iv. the mitigation of the impact (e.g., installation of a sub-slab depressurization system); or

v. the implementation of a monitoring program to evaluate the potential for human exposures related to soil vapor intrusion.

2. Adjacent residential properties. Where residential properties as set forth in paragraphs 1.12(b)1 and 2, or other uses appropriate to such residential use categories (e.g., schools), are adjacent to a site where a commercial or industrial soil cleanup is proposed, additional considerations are necessary during remedy selection. Specifically, the development of remedial alternatives must address, as set forth at 6 NYCRR 375-6.7(c), the migration of soil with remaining contamination which could impact these adjacent residential properties. The remedy selection process will consider, based on the findings of the RI:

i. whether contamination remaining after the application of commercial or industrial soil SCGs will, or may have the potential to, impact adjacent residential properties by one of the following pathways:

(1) through migration of soil as fugitive dust; or
(2) transportation of the soil by erosion through surface water runoff; and

ii. where the pathways identified in paragraph 1 above are a concern, the remedy must include provisions to protect the occupants of the adjacent residential properties from exposure through such pathways. Such provisions are based upon site-specific conditions, especially those conditions proximate to the residential properties; and may include, but are not limited to, the following:

(1) requiring the exposed surface soils, or any cover for exposed surface soils, meet residential soil SCGs across the site or in an appropriate buffer zone(s) proximate to the residential properties;
(2) additional remedial actions to address soil contamination in the soils which are subject to transportation. Such additional actions may be taken site-wide or in buffer zones (areally or vertically);
(3) requiring any exposed surface soil at the site to be vegetated or otherwise stabilized to control erosion; and/or
(4) exposure control measures, including but not limited to the application of a storm water pollution prevention plan consistent with the *New York State Guidelines for Urban Erosion and Sediment Control* (dated 1997), or updated version.

3. Surface water and sediments. When surface water and/or sediments are present on or proximate to a site and the RI has identified an impact the development of remedial alternatives, as set forth at 6 NYCRR 375-6.7(b), must consider and include provisions to protect the resource and eliminate or mitigate the threat to public health and the environment from the contaminated surface water or sediments. The remedy selection process will also consider:

i. whether contamination remaining in soil after the application of the applicable soil SCGs is impacting, or will have the potential to impact, surface water/sediments proximate to the site by one of the following pathways:

(1) through the migration of soil as fugitive dust;
(2) by the transportation of the soil by erosion through surface water runoff; or
(3) by the discharge of contaminated groundwater to a surface water body or wetland; and

ii. where the pathways for soil impacts to surface water/sediments identified in paragraph 1 above are a concern, the remedy must consider, in addition to addressing the source as provided in paragraph (d)2 above, additional remedial measures to prevent the migration of contaminants in soil at levels which could impact the water quality or adversely impact the sediments of a surface water body on or adjacent to the site. Such additional measures include, but are not limited to:
(1) additional remedial actions to address soil contamination in the soils which are subject to transportation. Such additional actions may be taken site-wide or in buffer zones (areally or vertically);
(2) additional remedial actions to address contaminated groundwater that is likely to reach the surface water body at levels which could adversely impact the water body or sediments;
(3) engineering controls to stabilize the soil and control erosion (e.g., vegetated soil cover);
(4) mitigation of the impact; for example, removing, containing or treating

impacted surface water and sediments resulting from any discharge addressed in accordance with subparagraph i above based upon the RAOs for surface water or sediments identified for the remedial program; and/or

(5) exposure control measures, including but not limited to the application of a storm water pollution prevention plan consistent with the *New York State Guidelines for Urban Erosion and Sediment Control* (dated 1997), or updated version.

4. Aquatic ecological resources. Where the FWRIA has identified actual or potential impacts to aquatic ecological resources in a surface water body, wetlands or sediments present on, or proximate to, a site, in the development of remedial alternatives the remedial party is required to:

i. evaluate the need for provisions to protect the aquatic resource and eliminate or mitigate threats to public health and the environment from contaminated surface water or sediments; and

ii. include in the alternative(s) evaluated necessary provisions:

(1) additional remedial actions to address soil contamination in the soils which are subject to transportation. Such additional actions may be taken site-wide or in buffer zones (areally or vertically);

(2) additional remedial actions to address contaminated groundwater that is likely to reach the surface water body at levels which could adversely impact the water body or sediments;

(3) engineering controls (e.g., vegetating the cover system);

(4) mitigation of the impact; for example, removing, containing or treating impacted surface water and sediments based upon the RAOs for surface water or sediments identified for the remedial program; and/or

(5) exposure control measures, including but not limited to the application of a storm water pollution prevention plan consistent with the *New York State Guidelines for Urban Erosion and Sediment Control* (dated 1997), or updated version.

(f) Soil cover. A soil cover is required as an element of any remedy where contamination is present in the exposed surface soil above the appropriate use-based soil SCG. Exposed surface soil is the soil which will be present at the surface of a site which is not otherwise covered by the development at the site (e.g., buildings, pavement, etc.). Soil covers as part of a site remedy to address exposed surface soil will be in accordance with this subdivision.

1. Soil to be used for the construction of a soil cover must be suitable to sustain the growth of appropriate vegetation and have concentration of contaminants which for:

i. sites in the BCP, will not exceed the applicable contaminant-specific soil cleanup objectives as set forth in 6 NYCRR 375-6.7(d)(1); or

ii. all other programs identified by subdivision 1.2(a), should not exceed the applicable contaminant-specific soil cleanup objectives as set forth in 6 NYCRR 375-6.7(d)(1) unless the site-specific background concentration for surface soil, as determined by subdivision 3.5.3(c), exceeds the soil cleanup objectives. In this latter event, the soil cover material imported or reused from the site in accordance with subdivision 5.4(e) may not exceed the site-specific background concentrations.

2. The depth of the exposed surface soil and hence the required soil cover will be dependent on the use of the site or the identification of ecological resources. Where the exposed surface soil at a

site exceeds the applicable SCO for protection of human health and/or ecological resources, the soil cover:

i. for residential or restricted residential use, is to be two feet;

ii. for commercial or industrial use, is to be one foot; or

iii. when an ecological resource has been identified, as set forth at 6 NYCRR 375-6.6:

(1) is to be a minimum of two feet; and
(2) when such a concern is identified by DEC, consideration should be given to supplementing the demarcation layer (see paragraph 3 below) to serve as an impediment to burrowing,.

3. A demarcation layer will generally be provided for soil covers. Approval of DER is required to dispense with a demarcation layer. For example, a demarcation layer may not be required where the soil remaining at the site is at or below background levels. This layer will be located between the soil cover, or fill meeting the soil cover requirements, and the soil where contamination will remain at the site.

4. The requirements for soil imported to the site for use, or site soils to be reused, in the soil cover are addressed in subdivision 5.4(e) and appendix 5.

4.2 Remedy Selection Evaluation Criteria

(a) In accordance with section 4.3, the remedial party should evaluate alternatives using the evaluation criteria set forth 6 NYCRR 375-1.8(f) in conjunction with the additional guidance provided for each criterion in subdivisions (b) through (j) of this section.

1. When performing this evaluation:

i. the first two evaluation criteria, subdivisions (b) and (c) below, are threshold criteria and must be satisfied in order for an alternative to be considered for selection; and

ii. the next six evaluation criteria, subdivisions (d) to (i) below, are primary balancing criteria which are used to compare the positive and negative aspects of each of the remedial alternatives, provided the alternative satisfies the threshold criteria.

2. After the decision document is subject to public comment, the final criterion, subdivision (j) community acceptance, is considered. This modifying criterion is evaluated after any public comments on the remedy have been received, prior to DER selection of the remedy.

(b) Overall protectiveness of the public health and the environment. This criterion is an evaluation of the ability of each alternative or the remedy to protect public health and the environment.

1. How each alternative would eliminate, reduce or control through removal, treatment, containment, engineering controls or institutional controls any existing or potential human exposures or environmental impacts identified by the RI.

2. The ability of each alternative to achieve each of the RAOs.

3. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with SCGs.

(c) Standards, criteria and guidance (SCGs). The remedy must conform to officially promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance as appropriate.

1. Conformance with standards and criteria is required, unless good cause exists why conformity should be dispensed with. Such good cause exist if any of the following are present:

i. the proposed action is only part of a complete program or project that will, as a whole, conform to such standard or criterion upon completion;

ii. conformity to such standard or criterion will result in greater risk to the public health and the environment than alternatives;

iii. conformity to such standard or criterion is technically impracticable from an engineering or scientific perspective; or

iv. the program or project will attain a level of performance that is equivalent to that required by the standard or criterion through the use of another method or approach.

2. Consideration is also given to guidance which through the application of scientific and engineering judgment, is determined to be applicable to the alternative evaluation.

3. All SCGs for the site are identified along with a discussion of whether or not the remedy will achieve compliance.

4. For those SCGs that will not be met, acceptable documentation of the basis must be submitted to DER for approval.

(d) Long-term effectiveness and permanence. This criterion is an evaluation of the long-term effectiveness and permanence of an alternative or remedy after implementation.

1. If contamination will remain on- or off-site after the selected remedy has been implemented, this evaluation will assess the impact of the remaining contamination on any of the following:

i. human exposures;

ii. ecological receptors; or

iii. impacts to the environment.

2. The evaluation of institutional and/or engineering controls performed in accordance with subdivision 4.3(b) is considered.

(e) Reduction of toxicity, mobility or volume of contamination through treatment. This criterion is an evaluation of the ability of an alternative or remedy to reduce the toxicity, mobility and volume of site contamination. Preference should be given to remedies that permanently or significantly reduce the toxicity, mobility or volume of the contamination at the site.

(f) Short-term impact and effectiveness. This criterion is an evaluation of the potential short-term adverse environmental impacts and human exposures during the construction and/or implementation of an alternative or remedy.

1. Identify the potential human exposures, adverse environmental impacts and nuisance conditions, at the site resulting from the implementation of the remedy or alternative. Identify how they would be controlled and the effectiveness of the controls. The potential short-term impacts to be evaluated include, nuisance conditions or potential exposures resulting from increased traffic, including truck trips, detours or loss of the use of access to property; odors; vapors; dust; habitat disturbance; run off from the site and noise.

2. A discussion of engineering controls that would be used to mitigate the short-term impacts (i.e. dust control measures) should be included.

3. The length of time needed to implement the remedy or alternative including time to achieve the remedial objectives should be estimated.

4. While sustainability will be a consideration in remedy selection, as set forth in section 1.14, it will not change any existing statute, regulation or guidance.

(g) Implementability. This criterion is an evaluation of the technical and administrative feasibility of implementing an alternative or remedy.

1. Technical feasibility includes the difficulties associated with construction and the ability to monitor the effectiveness of an alternative or remedy.

2. Administrative feasibility is evaluated, which includes:

i. the availability of the necessary personnel and material; and

ii. potential difficulties in obtaining specific operating approvals, access for construction, etc.

3. The evaluation of the reliability and viability of implementation of the institutional or engineering controls necessary for a remedy, as detailed in subdivision 4.2(b).

(h) Cost effectiveness. This criterion is an evaluation of the overall cost effectiveness of an alternative or remedy.

1. A remedy is cost effective if its costs are proportional to its overall effectiveness. To evaluate cost effectiveness:

i. the overall effectiveness of an alternative or remedy is determined by evaluating the criteria set forth in subdivisions (d), (e) and (f) above; and

ii. a comparison of the overall effectiveness is then made to the cost of the alternative or remedy; and

iii. an assessment is made as to whether the cost is proportional to the overall effectiveness, to determine whether it is cost effective.

2. Capital costs and costs associated with site management for each alternative are estimated in accordance with subparagraph 4.3(a)5.iii.

(i) Land use. This criterion is an evaluation of the current, intended and reasonably anticipated future use of the site and its surroundings, as it relates to an alternative or remedy, when unrestricted levels would not be achieved.

1. The evaluation must consider the following land use factors:

i. current use and historical and/or recent development patterns:

(1) understanding the current and reasonably anticipated future land use is a critical element in this determination; and

(2) the current use of the site, if it is presently being fully used is the best guide for future use;

ii. consistency of proposed use with applicable zoning laws and maps;

iii. brownfield opportunity areas;

iv. consistency of proposed use with applicable comprehensive community master plans, local waterfront revitalization plans as provided for in article 42 of the executive law or any other applicable land-use plan formally adopted by a municipality;

v. proximity to real property currently used for residential use and to urban, commercial, industrial, agricultural and recreational areas;

vi. any written and oral comments submitted by members of the public on the proposed use as part of citizen participation activities;

vii. environmental justice concerns, which for purposes of this evaluation, include the extent to which the proposed use may reasonably be expected to cause or increase a disproportionate burden on the community in which the site is located, including low-income minority communities, or to result in a disproportionate concentration of commercial or industrial uses in what has historically been a mixed use or residential community;

viii. federal or state land-use designations relating to the property;

ix. whether the population growth patterns and projections support the proposed use;

x. accessibility to existing infrastructure;

xi. proximity of the site to important cultural resources, including federal or state historic or heritage sites or Native American religious sites;

xii. natural resources, including proximity of the site to important federal, state or local natural resources, including waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species;

xiii. potential vulnerability of groundwater to contamination that might migrate from the site, including proximity to wellhead protection and groundwater recharge areas and other areas identified by the state comprehensive groundwater remediation and protection program;

xiv. proximity to floodplains;

xv. geography and geology; and

xvi. current institutional controls applicable to the site.

2. The final use determination for a site must be made to complete the remedy-selection stage of the remedial program. With DER approval, areas of a site or operable units may have different uses and restrictions provided each is clearly identified and defined by the institutional control and/or engineering control.

3. DER may approve:

i. an unrestricted-use remedial program which requires no restrictions placed on use of the site; or

ii: a restricted-use remedial program which relies upon restrictions on the use of the site. The following represents the hierarchy of the range from the least restrictive to the most restrictive land uses:

(1)	residential	Least Restrictive Use
(2)	restricted residential	⇕
(3)	commercial	
(4)	industrial	Most Restrictive Use

4. DER's determination of the allowable use of a site:

i. is not an acceptance of a site-specific post-remedial development plan for the site. Site-specific development proposals require compliance with the State Environmental Quality Review Act. In other words while the remedy may allow a certain category of use at a site (e.g., commercial) it does not authorize any particular development representing that use;

ii. is the least restrictive use of the site allowed by such remedial program and would allow all more restrictive uses to occur on the site (e.g., a site cleanup to a commercial use would also be protective for industrial use); and

iii. must be consistent with existing zoning laws or maps, unless it:

(1) is based on a cleanup level that would allow a less restrictive use of the site

than would be allowed based upon current zoning laws or maps (e.g., DER may approve a cleanup to residential levels for a property which is zoned for commercial use); or

(2) can be shown to DER's satisfaction that zoning changes are or will be sought, in which event DEC will conditionally approve the remedy but will not issue a certificate of completion or closure letter until such use is consistent with existing zoning laws or maps.

(j) Community acceptance. This criterion is evaluated after the public review of the remedy selection process as part of the final DER selection/approval of a remedy for a site.

1. Any public comment relative to these criteria will be considered by DER after the close of the public comment period.

2. Documentation of the public comments received is to be consistent with the citizen participation plan identified for a remedial program in accordance with applicable DEC policy..

4.3 Development and Evaluation of Alternatives

(a) The steps in the development and evaluation of alternatives to support the selection of a remedy for the applicable programs identified in section 1.2 are set forth in this subdivision.

1. Step 1. Identify the remedial goals for the site in accordance with subdivision 4.1(b) for the applicable program identified in subdivision 1.2(a).

2. Step 2. Establish RAOs in accordance with subdivision 4.1(c).

3. Step 3. Identify general response actions based on the RAOs, which:

i. include an estimate of the areas and volumes of contaminated media to be addressed;

ii include non-technology specific categories such as treatment, containment, excavation, extraction, disposal, institutional controls or a combination of such;

iii. are medium specific (e.g., soil, groundwater, etc.), similar to the development of RAOs, and should identify:

(1) the volumes or areas to be remediated for that alternative, for each medium addressed, characterized with respect to the requirements for the identified use of the site; and

(2) take into account the contaminant and geologic characterization of the site or operable unit;

iv. give preference to presumptive remedies where they are available to address the contamination identified. If a presumptive remedy is applicable:

(1) the list of presumptive remedies provided in applicable DER guidance should be used to identify the appropriate presumptive remedy; and

(2) this step is streamlined with the only requirement being the estimating of the volumes/areas of contaminated media to be addressed before proceeding directly to paragraph 5 below;

v. consider the use of innovative technologies, where available and applicable to site

contamination; and

vi. identify and discuss technologies which are clearly not appropriate for the site due to site-specific factors or constraints and eliminate them from further consideration .

4. Step 4. Identify and screen technologies for effectiveness and implementability. In this step of the process:

i. technology types and process options that are appropriate to the site-specific conditions and contamination are identified for each of the general response actions identified above:

(1) technology types include, but are not limited to, general categories such as chemical treatment, enhanced bio-degradation, thermal destruction, immobilization, capping, de-watering and

(2) process options that correspond with the technology types; for example chemical treatment would include, but not be limited to, precipitation, ion exchange, oxidation/reduction or others as other technology process options are identified;

ii. identified technologies are then screened, on a medium specific basis to identify those that are:

(1) technically implementable; and
(2) can, either alone or in combination with other technologies, meet the RAOs.

iii. pilot tests may be conducted or more data collected to support the feasibility of a technology, if applicable or requested by DER;

iv. technologies that are not technically implementable shall be dropped from further consideration; and

v. technologies that remain are used in the next step to assemble alternatives.

5. Step 5. Assemble the technologies remaining after Step 4, unless DER elects or agrees to limit the number of alternatives to be evaluated, into operable unit(s) or site wide alternative(s). In this step, the potential technologies are assembled into media-specific or site wide remedial alternatives. The identified alternatives should:

i. use the description of the alternative or remedy set forth in applicable DER guidance, where it is described in that guidance;

ii. be developed and defined to a level of detail such that each alternative is clearly defined with respect to:

(1) size and configuration of process options;
(2) time for remediation;
(3) spatial requirements;
(4) options for disposal;
(5) substantive technical permit requirements [see definition in paragraph 1.3(b)72];
(6) limitations or other factors necessary to evaluate the alternatives; and

(7) beneficial and/or adverse impacts on fish and wildlife resources. Refer to Appendix 4 FWRIA Part 3 ecological effects of remedial alternatives; and

iii. develop estimates of the remedial action costs including all costs associated with the development and implementation of a remedial action, which include:

(1) all direct and indirect capital costs and engineering costs for the construction of all facilities and process equipment, labor, materials, construction equipment and services, land purchase and land preparation/ development and relocation expenses;

(2) costs associated with the institutional controls required for a remedy - While the initial or capital cost of an institutional control may be minimal, the long-term costs must be estimated. Costs for securing the institutional control must be included in the estimate, such as payment for the easement however effects on the value of the property are not included;

(3) costs for system start up and testing, facility operation, maintenance and repair, continuous performance and effectiveness monitoring, periodic site condition reviews; and

(4) costs for legal, administrative and capital costs associated with the placement of institutional controls on a property and other site management activities and/or certifications;

iv. also present the net present worth of all remedial action costs over time by discounting all future costs to the current calendar year. The present worth costing analyses will use a current discount rate as specified by DER at the time of remedial action selection, which should be applied before taxes and after inflation. The period of performance evaluated should not exceed 30 years to allow consistent evaluation of costs only. It does not imply that the site management of a remedy will end after the cost estimating period, if applicable the remedy should note if it will exceed 30 years; and

v. at the conclusion of this step eliminate alternatives that are not technically implementable or prove not to be cost effective relative to the other alternatives developed from further consideration.

6. Step 6. Analyze the alternative(s) pursuant to the evaluation criteria in section 4.2. In this step:

i. each of the identified alternatives is evaluated pursuant to the eight evaluation criteria in subdivisions 4.2(b) to (i);

ii. where more than one alternative is developed, conduct a comparative analysis of each alternative to the other alternatives using the same criteria identified in subparagraph i above;

iii. the evaluation of institutional and engineering controls detailed in subdivision 4.2(b), is considered; and

iv. the criteria in subdivision 4.2(j), community acceptance of the remedy, is evaluated after any public comment period in accordance with DER 23 - *Citizen Participation Handbook.*

7. Step 7. Recommend a remedy for the site. Except for a State funded feasibility study, this step results in the identification of a recommended remedy and summarizes the reasons for the recommendation utilizing the criteria in section 4.2.

(b) Evaluation of institutional and/or engineering controls. DER may approve a remedy for a site

where the remedial program is being implemented pursuant to subdivision 1.2(a) that includes institutional controls and/or engineering controls as components of a proposed remedial program, provided the remedy selection report detailed in section 4.4 includes an evaluation of the institutional and/or engineering controls in accordance with this subdivision.

1. A complete description of any proposed use restrictions and/or institutional controls and the mechanisms that will be used to implement, maintain, monitor and enforce such restrictions and controls, by the remedial party and by state and local government.

2. A complete description of any proposed engineering controls and any site management requirements, including the mechanisms that will be used to continually implement, maintain, monitor and enforce such controls and requirements, both by the remedial party and by the state and local government.

3. An evaluation of the reliability and viability of the long-term implementation, site management and enforcement of any proposed institutional or engineering controls and an analysis of the long-term costs of implementing, maintaining, monitoring and enforcing such controls, including costs that may be borne by state or local government.

4. Sufficient analysis to support a conclusion that effective implementation, maintenance, monitoring and enforcement of institutional and/or engineering controls can be reasonably expected and will be sufficiently protective of human health and the environment.

5. Where appropriate, as set forth in 6 NYCRR 375-1.11(c), DER may require financial assurance to ensure the long term site management and enforcement of any such controls.

6. Any engineering control must be used in conjunction with an institutional control to ensure the continued integrity of any such control.

4.4 Remedy Selection Reporting Requirements

(a) The purpose of the reports outlined in this section are to document the process identified in subdivision 4.3(a) for the development and evaluation of remedial alternatives for the programs identified in subdivision 1.2(a).

1. Consistent with the level of documentation required by the site remedial program these reports will document:

i. the development of alternative remedies for a site;

ii. the evaluation of the alternatives based on the criteria presented in section 4.2; and

iii. recommendations for an appropriate final remedy.

2. Remedial selection reporting requirements for the applicable programs are as follows:

i. State or federal superfund programs. A feasibility study (FS) report prepared in accordance with subdivision (b) below;

ii. Environmental Restoration Program (ERP). An alternatives analysis (AA) report

prepared in accordance with subdivision (c) below;

iii. Brownfield Cleanup Program (BCP). An alternatives analysis (AA) report or the section of the remedial work plan presenting the alternatives analysis, prepared in accordance with subdivision (c) below;

iv. Voluntary Cleanup Program (VCP). An alternatives analysis (AA) report or section of the remedial action work plan presenting the alternatives analysis, prepared in accordance with subdivision (c) below, unless the site is a class 2 site where an FS (see subdivision (b)) is required; or

v. petroleum remediation site - an alternatives analysis (AA) report or the section of the remedial work plan presenting the alternatives analysis, prepared in accordance with subdivision (c) below.

3. The feasibility study and alternatives analysis, detailed in subdivisions (b) and (c) below, must be signed and stamped by a professional engineer licensed to practice in NYS in accordance with section 1.5.

(b) Feasibility Study (FS). The FS is the required remedy selection report for a site in any of the programs identified by subdivision 1.2(a), which is listed as a class 2 site on the NYS Registry of Inactive Hazardous Waste Disposal (Registry) Sites. The FS develops and evaluates options for a remedial action in accordance with CERCLA [40 CFR 300.430(e)] and a remedial party in any of the programs may also elect to prepare a FS to document the remedy selection process.

1. The FS emphasizes data analysis and is generally performed in an iterative fashion with the RI using data gathered during the RI to:

i. identify the goal of the remedial program;

ii. define the nature and extent of contamination to be addressed by the alternatives developed;

iii. identify the RAOs for the site, in accordance with subdivisions 4.1(b) and (c);

iv. develop remedial action alternatives; and

v. undertake an initial screening and detailed analysis of the alternatives.

2. The FS is an engineering report which documents the decision-making process for the evaluation of a remedy includes:

i. the RAOs established for the site in accordance with subdivision 4.1(c);

ii. each of the steps of the remedy evaluation outlined in subdivision 4.3(a) for the development and selection of alternatives;

iii. the evaluation of institutional controls and/or engineering controls in accordance with subdivision 4.3(b).

3. The FS is to identify and evaluate alternatives which are capable of achieving the goal, which is cleanup to pre-disposal or unrestricted condition. However the FS may also evaluate alternatives to achieve a cleanup necessary to meet an identified use of the site. This results in the FS developing a range of alternatives, as follows:

i. a no action or, where an IRM may already have addressed the disposal, no further action alternative;

ii. one or more alternatives capable of achieving unrestricted use, one of which is to be carried beyond step 5, as set forth in subdivision 4.3(a) into the final evaluation of alternatives;

iii. one or more alternatives capable of achieving the most feasible and least restrictive use of the site, as set forth in subparagraph 4.2(i)3.ii, as follows:

(1) either a residential or restricted-residential alternative is to be developed;
(2) followed by a commercial use alternative if this is within the intended and allowable use of the site; and
(3) may end with an industrial use alternative, if that is the intended and allowable use of the site; and

iv. the use of the site, however, must be consistent with local zoning in accordance with 6 NYCRR 375-1.8(g)(4) and (5) for the alternatives developed, unless it can be shown to DER's satisfaction that zoning changes are or will be sought. In that event, DEC will:

(1) conditionally approve the remedy; and
(2) will not issue a certificate of completion or closure letter until such use is consistent with existing zoning laws or maps.

4. The FS report should include the following sections:

i. introduction;
ii. site description and history;
iii. summary of RI and exposure assessment;
iv. remedial goals and remedial action objectives;
v. general response actions;
vi. identification and screening of technologies;
vii. development and analysis of alternatives, which
(1) assembles technologies into alternatives;
(2) evaluates alternatives with respect to the criteria in section 4.2; and
(3) evaluates the institutional/engineering controls for the selected remedy, in accordance with subdivision 4.3(b); and
viii. recommended remedy, with a discussion supporting why it is recommended, except as set forth in paragraph 4.3(a)7.

(c) Alternatives Analysis Report (AA). The AA is a report, or portion of a remedial work plan, which identifies one or more alternatives and evaluates the effectiveness of each with respect to the criteria in subdivision 4.2(a). The AA is generally prepared by the remedial party for all sites other than class 2 Inactive Hazardous Waste Disposal Site Registry sites (see subdivision (b) above).

1. The analysis and considerations for an AA should be as set forth in paragraph (b)1 above.

2. The AA is an engineering report that documents in sufficient detail to support the decision-making process for the selection of a remedy, including:

i. the RAOs for the site, in accordance with section 4.1 above;

ii. the type and number of alternatives required to be evaluated for the applicable remedial program, in accordance with subdivision (d) below;

iii. the recommended remedy's compliance with the criteria identified in section 4.2;

iv. only those steps in subdivision 4.3(a), required by the program for which the AA is prepared, in accordance with subdivision (d) below;

v. if applicable, the evaluation of institutional/engineering controls detailed in subdivision 4.3(b) in accordance with subdivision (d) below, if applicable;

vi. a detailed description, equivalent to an engineered conceptual model, of the recommended remedy along with a demonstration that the remedy can achieve the remedial action objectives for the site or area of concern; and

vii. the use of the site must be consistent with local zoning in accordance with 6 NYCRR 375-1.8(g)(4) and (5) for the alternatives developed, unless it can be shown to DER's satisfaction that zoning changes are or will be sought. In that event, DEC will

(1) conditionally approve the remedy; and
(2) will not issue a certificate of completion or closure letter until such use is consistent with existing zoning laws or maps.

3. The AA report should include the following sections:

i. introduction;
ii. site description and history;
iii. summary of RI and exposure assessment;
iv. remedial goals and remedial action objectives;
v. development and analysis of alternatives, which
(1) assembles technologies into alternatives;
(2) evaluates alternatives with respect to the criteria in section 4.2; and
(3) evaluates the institutional/engineering controls for the selected remedy, in accordance with subdivision 4.2(b); and
vi. recommended remedy, with a discussion supporting why it is recommended.

(d) Alternatives to be evaluated by the AA. The number of alternatives to be evaluated by an AA will vary for each program.

1. The AA for an ERP site will develop, at a minimum:

i. the no action or, where an IRM may already have addressed the disposal, no further action alternative;

ii. an alternative that achieves the unrestricted soil cleanup objectives;

iii. sufficient additional alternatives to perform an alternatives analysis consistent with paragraphs 4.3(a)5, 6 and 7, and subdivision 4.3(b); and

iv. an alternative which can be recommended to satisfy the requirements of 6 NYCRR 375-4.8(d) and (e).

2. The AA for a BCP site will develop, at a minimum:

i. one alternative, if the alternative proposed will achieve unrestricted use relative to soil contamination without the use of institutional/engineering controls (Track 1);

ii. two or more alternatives, if the proposal is for restricted use, where:

(1) one alternative will achieve unrestricted use relative to soil contamination, without the use of institutional/engineering controls; and

(2) such other alternatives proposed by the remedial party which would achieve the cleanup Track and intended use identified for the site; and

iii. significant threat implications for the alternatives analysis:

(1) if the site has been determined by DER to represent a significant threat pursuant to 6 NYCRR 375-1.7, DER may require the remedial party develop and evaluate additional alternatives which would achieve the cleanup Track and intended use identified for the site; or

(2) if the site had been determined by DER not to constitute a significant threat; DER may require a Track 2 evaluation if one has not already been evaluated after considering the following factors:

(A) the degree to which the remedy selection criteria would be better satisfied by a Track 2 cleanup;

(B) the degree of impact a Track 2 cleanup would have on the applicant's ability to successfully cleanup and/or redevelop the property;

(C) the benefit to the environment to be realized by the expeditious remediation of the property; and

(D) the economic benefit to the State to be realized by the expeditious remediation of the property.

3. The AA for the a VCP or petroleum bulk storage site subject to subdivision 1.2(b) will develop at least one alternative:

i. unless DER requests that additional alternatives be evaluated and documented; or

ii. the remedial party elects to evaluate and document additional alternatives.

4. Petroleum remediation sites, subject to subdivision 1.2(b). The AA for petroleum remediation sites will develop, document and evaluate multiple alternatives sufficient to address the scope of the site contamination, unless DER agrees to the development of a single alternative.

4.5 Remedy Selection Decision Documentation

(a) DER will prepare and issue an agency decision document (DD) for the applicable programs identified in subdivisions 1.2(a) and (b).

1. For State Superfund and ERP sites. DER will prepare a Proposed Remedial Action Plan (PRAP) which identifies the DER-proposed remedy for the site or operable unit(s), which summarizes the contamination identified by the RI, and the alternatives considered and discusses the reasons for proposing the remedy. The PRAP will:

i. include the information required by:

(1) 6 NYCRR 375-2.8(e) for a SSF site; or
(2) 6 NYCRR 375-4.8(e) for an ERP site;

ii. be made available for review and subject to public comment for no less than:

(1) 30 days for SSF sites; and
(2) 45 days for ERP sites; and

iii. result in DER preparing and issuing a Record of Decision (ROD), after completion of the public comment period,. The ROD will:

(1) select the remedy; and
(2) include a responsiveness summary to public comments and concerns raised during the public comment period.

2. Except as set forth in subdivision 4.5 (b) for BCP, VCP, petroleum remediation sites and bulk storage sites subject to this guidance, DER will prepare a draft DD which summarizes the contamination identified by the RI and detail the components of the site remedy. The DD will:

i. be made available for review and public comment for a period of no less than:

(1) 30 days for VCP/petroleum sites managed pursuant to subdivision 1.2(b); or
(2) 45 days for BCP sites; and

ii. after completion of the public comment period, DER will prepare and issue a final DD.

(b) For Class 2 sites in either the VCP or BCP, paragraph (a)1 above will apply for the DD.

CHAPTER 5 REMEDIAL DESIGN/REMEDIAL ACTION

5.1 General

(a) This chapter provides guidance for the remedial design and remedial action elements of the remedial program, including all interim remedial measures (IRMs) and underground storage tank (UST) removals. The section index is provided below.

1. Section 5.2 Preparation of a Remedial Design (formal plans and specifications level of detail), including the remedial design work plan.

2. Section 5.3 Preparation of a Remedial Action Work Plan.

3. Section 5.4 Remedial Action Implementation Compliance.

4. Section 5.5 Underground Storage Tank Closure.

5. Section 5.6 Institutional Control Implementation.

6. Section 5.7 Remedial Construction Schedules and Reporting Requirements for the Remedial Action.

7. Section 5.8 Construction Completion and Final Engineering Reports (FERs).

(b) Schedule and notices. Schedule and/or notice requirements apply to the design and implementation of a remedial program.

1. The remedial party will comply with the schedule of submissions and notice provisions of the oversight document.

2. If not already expressly addressed by paragraph 1 above, the remedial party must:

i. provide any notices identified in subdivision 1.4(c);

ii. notify DER at least 7 business days prior to the initiation of any field investigations conducted in support of the remedial design; and

iii. notify DER at least 30 days before initiating:

(1) an underground storage tank closure in accordance with section 5.5; or
(2) a remedial action for which DER oversight is to be provided.

3. A schedule for conducting the:

i. remedial design will be included in the remedial design work plan; and

ii. remedial action will be provided with the submission of the remedial design or the remedial action work plan, in accordance with section 5.7.

(c) Common elements. Documents for each remedial program, developed in accordance with sections 5.2 or 5.3, should incorporate the common elements presented in this subdivision.

1. If a remedy was selected pursuant to Chapter 4, the design and construction work plans will be prepared in accordance with sections 5.2 and 5.3 prior to implementation.

2. The remedial action design and implementation should comply with the remedy selected by the approved DER decision document, unless a subsequent modification has been approved by DER in accordance with applicable DER policies (see, for example, DER-2 *Making Changes to Selected Remedies*).

3. The remedial action should be designed to:

i. comply with applicable federal, state and local laws, regulations and requirements;

ii. prevent any uncontrolled, or unapproved discharge or transfer of contaminants from one medium to another during its implementation or operation;

iii. provide specifications and data necessary for the development and implementation of a health and safety plan, as described by section 1.9, to include, at a minimum, a site-specific:

(1) community air monitoring plan (CAMP), prepared in accordance with the generic CAMP guidance in Appendix 1A; and
(2) fugitive dust/particulate monitoring component of the CAMP, prepared in accordance with Appendix 1B;

iv. where institutional or engineering controls are required, provide for development of an appropriate SMP in accordance with Chapter 6; and

v. provide the remedial design/remedial action documents detailed in this section, in accordance with the certification provision in section 1.5.

4. Access. Documentation of the necessary property access to implement and maintain the remedial program, including specific milestones to obtain the access, if required.

5. Institutional controls. Documentation of the remedial party's ability to implement the necessary institutional controls (e.g., environmental easements, deed restrictions), where necessary.

6. Permits or other authorizations. Permits or other authorizations necessary to implement the remedial program, or for which the permit exemption provisions of section 1.10 apply, should be identified, along with any information necessary for demonstrating compliance with the substantive permit/other authorization requirements. Permit or other authorizations exemptions are discussed in section 1.10.

7. Sustainability. DER will foster the use of best management practices (BMPs) for green remediation at contaminated sites. Sustainable practices result in cleanups minimizing the environmental and energy "footprints" of all actions taken during a project life. BMPs of green remediation emphasize a "whole-site" approach that closely evaluates core elements of a cleanup project:

i. energy requirements;

ii. air emissions;

iii. water requirements and associated impacts on water resources;

iv. impacts on land and ecosystems;

v. material consumption and waste generation; and

vi. impacts on long-term stewardship of a site.

(d) Protection of identified fish and wildlife resources. For sites where fish and wildlife resources have been identified as impacted by site-related contamination and require remedial action or are likely to be impacted by the remediation of other areas of the site, the remedial design or remedial action work plan must include appropriate measures for delineating and protecting the identified resource or habitat and for monitoring related impacts during the implementation of the remedial action.

1. The steps necessary to comply with this subdivision are collectively identified as a FWRIA Part 4, resource considerations for design and construction.

2. Any ecological resources identified by the FWRIA Part 1, completed in accordance with subsection 3.10.1, should be delineated in the field and shown on the construction drawings if they:

i. will be impacted by the remedy;

ii. are in areas to be disturbed to implement the remedy; and/or

iii. are subject to regulation.

3. Regional Division of Fish Wildlife and Marine Resources (DFW&MR) and/or the NYS Natural Heritage Program representatives should be contacted to arrange delineation of:

i. NYS regulated wetlands. A wetland field delineation may be required as part of the design development to provide a reference for restoration and/or mitigation of wetlands disturbed or filled in as part of the remedial action; or

ii. endangered, threatened or special-concern species or their habitat and rare ecological communities. The remedial design and remedial action (RD/RA) should avoid incidental or construction related impacts to these resources.

4. The substantive technical requirements of applicable resource-related permits (e.g., 6 NYCRR Parts 608, 661, 663) must be identified during the design and complied with for the site either during the design or construction of the remedy.

5. Where resources will be disturbed during remediation, or if loss of wetlands or other ecological resources is unavoidable, design elements and specifications for resource restoration and/or mitigation should be included in the remedial design document.

6. Procedures for protection of seasonal fish and wildlife resources such as construction windows to avoid fish spawning, bird nesting, animal migrations, etc., must be considered and identified during the design and incorporated in the remedial design documents, as appropriate.

7. A plan for any required baseline or post-remedial fish and wildlife resource monitoring should be developed during the remedial design and included in the monitoring plan included as a component of the SMP developed according to subsection 6.2.2. Any required baseline monitoring of the site and/or reference locations should be completed prior to the start of construction activities on site, in accordance with the schedule developed pursuant to paragraph (b)3 above.

8. All fish and wildlife and natural resources-related restrictions, special provisions, restorations, erosion control or other protective measures should be included on the construction drawings.

9. Construction related impacts must be monitored during implementation of the remedy according to the specifications and procedures contained in the RD/RA work plan. Construction monitoring may include:

i. implementation of soil and sediment erosion and storm water management and monitoring procedures developed in accordance with sections 5.2 or 5.3 to ensure protection of terrestrial, aquatic and marine habitats potentially affected by runoff or discharge from the construction area;

ii. surface water monitoring for turbidity, particulates, sheens and contaminants of concern, including the use of passive in-situ contaminant extraction samplers (PISCES) or semi-permeable membrane devices (SPMDs);

iii. monitoring water levels and/or vegetation in wetlands or water bodies affected by water management activities such as temporary dewatering facilities;

iv. periodic observation of behavior or health of endangered, threatened or special concern species or rare ecological communities; and/or

v. biota tissue sampling.

(e) Remedial action monitoring plan (RAMP). For sites where the remedial action may require a significant amount of monitoring during the action, the remedial design should consider including a RAMP.

1. A RAMP details the monitoring needs by:

i. identifying the frequency of sampling/monitoring;

ii. describing the specific steps involved;

iii. providing or referencing an applicable quality assurance/quality control plan; and

iv. detailing how the information will be reported.

2. A RAMP may be necessary for, the following type of projects or project elements:

i. dredging projects to include upstream and downstream water quality monitoring;

ii. sediment or sludge dewatering facilities;

iii. storm water management facility discharge monitoring;

iv. noise monitoring; and/or

v. monitoring of downstream or downgradient public water supplies.

(f) Community and environmental response plan (CERP). For certain sites where the remedial action will require controls, monitoring or work practices to address the potential for short-term impacts to the surrounding community or environmental resources, the remedial design or remedial action work plan should consider the development of a CERP. A CERP, while not appropriate for many sites, may be helpful by providing the measures to protect the community and environment during the remedial action in one location in the document. This has been shown to facilitate citizen participation efforts and provide information on required protective measures to contractors and subcontractors.

1. For sites where only a CAMP is required, a standalone CERP should not be prepared.

2. A CERP should be considered for sites where concerns have been raised relative to the protection of the public during the implementation of the remedial action, due to the proximity of adjacent properties or other sensitive receptors and/or where the public will continue to have limited access to a site during the remedial action.

3. The CERP should be a concise summary of the controls, monitoring or work practices and how they combine to provide the necessary protection of the community and ecological resources, the details of how these are to be implemented will be included in the technical specifications of the design.

4. The elements of a CERP should include, as applicable to the site, the following:

i. a summary of the CAMP;

ii. identification of any temporary measures to be erected or installed to protect the public on or adjacent to the site, from exposure;

iii. vapor/odor management plans, which identify the measures to be undertaken during the remedial action to monitor, prevent or control the generation of vapor or odors during the remedial action. This element of the CERP should identify the triggers which will require action to mitigate vapor/odors or which may trigger the need for alternative construction methods or shut down of the operation resulting in the odors or vapors;

iv. noise and vibration mitigation, which identifies the measures to be undertaken during the remedial action to monitor for and control noise and/or vibration resulting from activities at the site. This should include levels of measurable noise or vibration which may trigger the need for alternative construction methods or shut down of the operation resulting in the noise or vibration;

v. measures to secure the site from trespassers;

vi. erosion and sediment control measures to comply with the substantive requirements of a storm water management permit;

vii. waste management measures, which identify the steps to be undertaken by the contractor or remedial party to manage the waste storage, treatment or disposal resulting from the implementation of the remedy;

viii. water management and treatment measures, which identify the steps to be undertaken to manage the storage, treatment or disposal of contaminated water generated by the implementation of the remedy;

ix. traffic control and site access plans, which identify the measures to be undertaken to control traffic, deliveries and waste transport from the site;

x. decontamination of trucks and equipment leaving the site, which describes the procedures and equipment necessary to prevent cross-contamination from the excavation to public areas (highways, roads, support trailer, vehicles, etc.); and/or

xi. off-site trucking routes and emergency procedures.

(g) Protection of cultural resources. For sites where cultural resources have been identified which may be disturbed or otherwise impacted by the implementation of the remedy, the design document should include measures to address or mitigate the disturbance or impact. The DEC website identified in the table of contents includes links to applicable guidance identifying the measures necessary for compliance.

5.2 Remedial Design

(a) This section applies where a formal remedial design is required by DER or the remedial party elects to perform this level of detail. Where a formal remedial design is not prepared, a remedial action work plan should be completed, as detailed in section 5.3.

(b) The first step in a formal design is the preparation and submission of a remedial design work plan (RDWP) according to the schedule in the oversight document. The RDWP should be in a format that is consistent with the outline and substance of this subdivision.

1. Introduction. The first section of the RDWP must summarize the nature and extent of contamination identified by the RI and the selected remedy to be implemented by the design. If the RI and remedy selection reports were previously approved as part of a DER remedial program, a copy of the decision document may be provided in lieu of this summary. The identification of all applicable SCGs is included in this section.

2. Design investigations. The second section of the RDWP must identify any data needed to complete the design and include work plans for any investigations to gather this information. This section of the RDWP should include:

i. a summary table of the number, required analytical procedures and any special considerations (such as depth of the sample) for any samples to be collected and analyzed as part of the design effort;

ii. the locations of these samples should be identified on an accompanying figure;

iii. a scope of work, as needed to clarify the intent and goals of the sampling; and

iv. if the same figures developed during previous investigations at the site cannot be used:

(1) a QAPP, including proposed sampling and analytical methods, in accordance with section 2.4;

(2) HASP with a CAMP, in accordance with section 1.9; and

v. a schedule which identifies the documents to be prepared as part of the design and the timing for their submission, as well as for conducting any design investigation.

3. Design scope. The third section of the RDWP must provide a detailed description of the remedial action and the remedial technology(ies) for which the design is to be provided, detailed by OU or AOC. Consideration should be given to the need for the inclusion of a RAMP or CERP in the final design, as set forth in subdivisions 5.1(e) and (f) respectively.

4. Permits or other authorizations. The fourth section of the RDWP must identify all required permits and/or exempted permits or other authorizations, in accordance with section 1.10, to be addressed by the design including the identify all substantive conditions to be addressed in the design.

5. Schedule. The fifth section of the RDWP is to be a detailed schedule for the completion of the design, including any necessary design investigations. This section should also identify and discuss, to the extent necessary, the proposed steps and timing for procurement of the remedial action contractor

6. Post construction plans. To the extent necessary, a sixth section of the RDWP should outline:

i. the requirements for the SMP, to be developed in accordance with Chapter 6 including a schedule for the submission of the SMP, which takes into account:

(1) the proposed initiation of any portion of the remedy subject to such plan and the items identified in paragraph 5, above; and

(2) that the SMP must be approved by the DER prior to the approval of the FER;

ii. the scope of the required surveys and documents to support the development of the environmental easement or deed restriction and a schedule for the steps needed to complete this requirement;

iii. describe the institutional controls to be implemented. Where the remedial party is not the owner of the site on which the institutional control will be placed, the work plan should require a written agreement from the property owner committing to the necessary environmental easement prior

to the design completion; and/or

iv. post-construction sampling to verify that a sub-slab depressurization or soil vapor extraction system meets the design standards (e.g., verify the radius of influence).

7. Site figures. The last section of the RDWP is to include a scaled site map identifying all areas where remedial actions will be conducted, which should specify, as appropriate or identified at this point in the project, the following:

i. the proposed location of remedial treatment units;

ii. the areas, with volumes if applicable, for each environmental medium to be remediated;

iii. the vertical and horizontal extent of area to be remediated;

iv. the location, depth and concentration of all contaminants in excess of the remedial action objectives;

v. sample locations, depths and parameters for all confirmation and/or documentation samples in accordance with subdivision 5.4(b); and

vi. wetlands, streams or other habitats potentially disturbed by the remedial action.

(c) A remedial design should incorporate all of the elements of the remedy into a set of biddable quality plans and specifications.

1. Preliminary design. A preliminary design, which is typically submitted at a point from the 50-75% completion level, may be required by the RDWP based on the complexity of the project. The appropriate completion level for the submission is determined by the RDWP.

2. A 95% completion submission of the design plans and specifications is typically required by the RDWP. This submission does not have to be stamped by a professional engineer, unless the remedial party will use the 95% design to procure a contractor who then produces certain plans, based on the remedial party's performance specifications, to provide the final design. In this event, the 95% submission is to be stamped and signed by a professional engineer as set forth in section 1.5.

3. A final design submission of the plans and specifications which is signed and stamped by a professional engineer licensed to practice in NYS and includes the required certification set forth in subdivision 1.5(b).

4. A cost estimate of the remedial actions at:

i. State Superfund sites; or

ii. ERP sites.

(d) The remedial design should incorporate provisions for the preparation, at the completion of the remedial action, of a set of “as-built” drawings to be stamped by a professional engineer licensed to

practice in New York State as set forth at section 1.5 and include the appropriate certification set forth in subdivision 1.5(b), in addition to a CCR or FER, as set forth in section 5.8.

(e) Electronic submissions. The remedial design and all required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

5.3 Remedial Action Work Plan

(a) If a remedial design in accordance with section 5.2 is not required, a remedial action work plan (RAWP) in a format that conforms with the outline of subdivision (b) below is to be provided in accordance with the schedule contained in the applicable oversight document.

1. The RAWP should address the requirements of sections 5.1 and 5.2, however with less detail than anticipated by a formal design.

2. The final RAWP must be stamped and signed by a professional engineer licensed to practice in New York State in accordance with section 1.5 and include the certification as set forth in subdivision 1.5(b).

(b) The RAWP must include, at a minimum, the elements identified and detailed in this subdivision.

1. A detailed description of the remedial action and the remedial technology to be conducted for each area of concern. This must be of sufficient detail for a contractor to delineate any areas targeted for removal, construct necessary engineering controls, or design and install necessary treatment systems.

2. The location and description of any temporary construction facilities or treatment units required to implement the remedial action. A listing of all applicable SCGs relating to the construction of on-site remedial units, including inspection and professional engineer certification.

3. A description of soil and sediment erosion control, storm water management and monitoring and dust, odor and organic vapor control and monitoring procedures to be implemented during remedial activities, if applicable. Consideration should be given to the need for a CERP as set forth in subdivision 5.1(f).

4. A health and safety plan pursuant to section 1.9, to include the CAMP.

5. A detailed description of confirmation and documentation sampling, as set forth in subdivision 5.4(b).

6. A description of procedures for dismantling and removing remedial structures and equipment, if applicable, as well as site restoration plans to comply with subdivision 5.4(d).

7. A cost estimate of the remedial action for remedial actions at:

   i. State Superfund sites; or

   ii. ERP sites.

8. A schedule in accordance with section 5.7.

9. A description of institutional controls to be implemented. Where the remedial party is not the owner of the site on which the institutional control will be placed, the work plan must include a written agreement from the property owner committing to the necessary environmental easement or deed restriction prior to the design completion.

10. A requirement to submit a SMP in accordance with section 6, including a schedule for the submission of the final plan, taking into account the items identified in paragraph 5.2(b)7.

11. Drawings and figures, as needed, to define the elements of the remedial construction in satisfaction of paragraphs 1 through 6 above.

(c) The remedial design should incorporate provisions for the preparation, at the completion of the remedial action, of a set of "as-built" drawings, in addition to a construction completion or FER, as set forth in section 5.8 in accordance with subdivision 5.2(b).

(d) Electronic submissions. The RAWP and any required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

5.4 Remedial Action Implementation Compliance

(a) Compliance with community air monitoring plan (CAMP), dust monitoring or other controls identified by the CERP, if required for the remedial action. The approved CAMP and the fugitive dust/ particulate monitoring program, which is a component of the CAMP, are critical elements in the evaluation of RA compliance.

1. Guidance for monitoring compliance of:

i. the CAMP is provided in Appendix 1A; and

ii. the fugitive dust/particulate monitoring plan is provided in Appendix 1B.

2. The monitoring data gathered by the implementation of these plans is to be provided to DER on a regular basis. The frequency is identified in the approved construction schedule and/or RAMP prepared in accordance with subdivision 4.1(e). Real time or web based reporting may be required by DER on a case-by case basis.

3. Any monitoring results which exceed the action levels set by the CAMP are to be:

i. reported, or notice provided by another arrangement acceptable to DER:

(1) when identified, when a DER representative is present at the site; or
(2) within two hours by phone call or e-mail, to DER project manager when no DER representative is on the site; and

ii. summarized in a weekly, or other period identified by DER, CAMP report, including the duration and actions taken in response to any such exceedance. A template of the CAMP

report is available on DEC's website identified in the table of contents.

4. If applicable for the remedial action, a report on any other controls identified by a CERP.

(b) Compliance with site-specific soil cleanup levels. Evidence of compliance with a remedy=s achievement of the soil cleanup levels identified for the site will be through the collection and analysis of compliance samples during the implementation of the remedy. These compliance samples, either documentation or confirmation samples, are discussed in paragraphs 1 and 2 below and are determined based upon the endpoint defined for the remedial action by the decision document.

1. Documentation samples, as defined in paragraph 1.3(b)12, are generally required by a site remedy when the soil cleanup is based on (an) excavation(s) to pre-specified excavation limits described in the remedy decision document and delineated during remedial design. Documentation samples are collected and analyzed to document the soil levels achieved by the remedy.

2. Confirmation samples, as defined in paragraph 1.3(b)3, are required when the limits of soil removal are to be determined by achieving a soil cleanup level in the field. Confirmation samples are to demonstrate that the remedy has achieved the soil cleanup levels identified by the decision document, determined as follows:

i. the use of averages, means or other statistical techniques are generally not allowed, however, recognizing the heterogeneity of contaminated sites and the uncertainty of sampling and analysis of samples, the DER project manager may judge that remediation is complete for sites when:

(1) there is a large number of confirmatory samples;
(2) the vast majority of confirmation samples indicate that the soil cleanup levels for the site have been achieved; and
(3) those that do not achieve the SCO exceed it only by a small amount; and

ii. should the remedial party disagree with the professional judgment of the DER project manager, the remedial party may submit a justification that there is a 95% confidence level that the soil cleanup levels have been achieved using the procedure defined in the EPA guidance document *Supplemental Guidance to RAGS: Calculating the Concentration Term. USEPA Publication 9285.7-081* (May 1992). DER will evaluate this information and make a determination whether the sampling adequately documents that the objectives have been achieved.

3. All sample collection should be in accordance with sections 3.2 through 3.5.

4. All sample analysis and the reported results should be consistent with sections 2.1 through 2.3.

5. The following are minimum confirmation sampling frequencies for soil excavations of:

i. less than 20 feet in perimeter, include one bottom sample and one sidewall sample biased in the direction of surface runoff;

ii. 20 to 300 feet in perimeter, where the remedy is seeking to achieve:

(1) surface soil levels, one sample from the top of each sidewall for every 30

linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area; and

(2) subsurface soil cleanup levels, one sample from the bottom of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area;

iii. greater than 300 feet in perimeter, should be in accordance with either:

(1) subparagraph ii above; or

(2) a DER-approved reduced sampling frequency, where the remedial party submits a proposed sampling frequency, with supporting rationale, in accordance with section 1.6;

iv. in an excavation where multiple layers of contamination have been visually or analytically identified, additional side wall samples in the horizon in which contamination was identified are necessary;

v. each excavation within a larger excavation will be considered a separate excavation and should comply with subparagraphs i through iii above; and

vi. for side or bottom samples, for volatile organic compounds in an excavation:

(1) within 24 hours of excavation, they should be taken from the zero to six-inch interval at the excavation floor; or

(2) after 24 hours, the samples should be taken at six to twelve inches; and

vii. no water should be present in the excavation bottom where bottom samples are collected.

6. For tank excavations. When tanks are excavated, if contaminated soil is removed, confirmation soil samples for laboratory analysis should be taken:`

i. immediately after contaminated soil removal, pursuant to paragraph 5.4(b)5; and

ii. if the excavation is enlarged horizontally beyond the immediate tank removal area, additional soil samples will be taken pursuant to paragraph 5.4(b)2 or in accordance with subdivision 5.5(c) when a site characterization in accordance with subdivision 3.1(a) is determined necessary by this subdivision.

7. Confirmation and/or documentation sample locations and depth should be biased toward the:

i. areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated; and

ii. locations and depths of the highest expected contamination.

(c) Compliance for in-situ treatment technologies. A sampling program should be undertaken for sites where an *in situ* remediation technology is a component of the remedial program.

1. The work plan for the sampling program is to be approved by DER and is to be consistent with the investigation work plan requirements of section 3.3 and the applicable media specific requirements of the sections 3.5, 3.7 or 3.8.

2. The sampling program must:

i. determine whether the design parameters of the treatment system are being achieved;

ii. determine whether any discharges are compliant with identified permit or exempted permit, limits established for the site; and/or

iii. document the effectiveness of the system, in accordance with subdivision 6.2.2 (c).

(d) Compliance with site restoration activities. All areas of the site or adjacent areas which are disturbed or otherwise used during implementation of the remedial program should be subject to the site restoration requirements of the site decision document or approved remedial design/RAWP.

1. Site restoration should include:

i. restoring the site and/or adjacent areas to pre-remediation conditions with respect to topography, hydrology and vegetation, to the extent practicable;

ii. restoration related to an approved development plan for the site (e.g., increasing soil cover depth to account for a 100 year flood elevation); or

iii. where development is planned and a final restoration has not been identified or approved, the RD or RAWP will provide for, at a minimum, restoration sufficient to ensure the effectiveness and compliance with the remedial program.

2. It should be noted that some site restoration measures for remedial activities within or adjacent to wetlands, flood plains or other environmentally sensitive areas may have further requirements under the following DEC regulations (e.g., 6 NYCRR Parts 182, 500-502, 608, 661 & 663).

3. Where site restoration calls for the abandonment of monitoring, recovery, injection or other wells installed as part of the remedial program, the decommissioning should be approved by DER and performed in accordance with DEC guidance, e.g. CP-43 *Commissioner's Policy on Groundwater Monitoring Well Decommissioning*, available on DEC's website identified in the table of contents.

(e) Compliance for soil which exists at or is imported to a site. Soil which exists at, or is imported to, a site which is used to construct a soil cover, site cap system or as excavation backfill must meet the requirements of 6 NYCRR 375-6.7(d) and;

1. Soil imported to a site for use in a soil cap, soil cover or as backfill will:

i. comply with any RAOs which may be identified for a soil cover or the soil comprising a cap, by a remedy selected pursuant to Chapter 4.

ii. be free of extraneous debris or solid waste;

iii. be recognizable soil or other unregulated material as set forth in 6 NYCRR Part 360 and materials for which DEC has issued a beneficial use determination, which comply with the requirements of paragraph 2 below;

iv. not exceed the allowable constituent levels for imported fill or soil as described in paragraph 2 below, unless a site-specific exemption is provided by DER in accordance with paragraph 8 below; and

v. be tested as described in paragraph 3 below.

2. The fill material should not exceed the allowable constituent levels for imported fill or soil for the use of the site which are provided in Appendix 5, taking consideration that where the protection of ecological resources SCO is required for the site, the protection of ecological resources SCO must also be considered in selecting the lowest of the applicable SCGs. Where a compound is detected which is not on the Appendix 5 table the remedial party should:

i. determine if the constituent of concern is included on the supplemental soil cleanup objective tables in CP-Soil and if so use the CP-Soil values as the allowable constituent level; or

ii. consult with DER to determine an allowable constituent level.

3. Sampling is required for all imported soil for use as backfill or cover material. Sampling frequency of the material will be determined by the remedial design or remedial action work plan:

i. considering Table 5.4(e)10 and paragraph 10 below, and sampling will be performed consistent with sections 2.1 through 2.3;

ii. with a minimum one sample analyzed from every new source, at the following sampling frequency for:

(1) soil or sand imported from a virgin mine/pit, at least one round of characterization samples for the initial 100 cubic yards of material, in accordance with Table 5.4(e)10 below;

(2) material sources other than a virgin mine/pit (e.g., a former manufacturing site), in accordance with Table 5.4(e)10; or

(3) sites where large amounts of cover material/backfill are required, the sampling frequency can be reduced from that specified in Table 5.4(e)10 once a trend of compliance is established; and

iii. the DER project manager may modify the number of samples required by subparagraph ii above based on the site being remediated and the source of the material, in accordance with the modification provisions set forth in section 1.6.

4. Reuse of soil from the site. Soil originating on the site may be reused on the site or exported for reuse provided sampling demonstrates compliance with SCGs as detailed in Table 5.4(e)4. Soil which is not going off-site for reuse will be disposed in a permitted treatment, storage or disposal facility, unless paragraph 10 below provides for such export.

Table 5.4(e)4 Reuse of Soil [for Paragraph 5.4(e)4]		
Soil on the Site Meets:	**Reuse on the Site:**	**Off-site Export & Reuse:**
Unrestricted Soil SCGs	Without restrictions	Without restrictions
Meets the Applicable Use-based and Groundwater Protection SCG and where Appropriate Protection of Ecological Resources Soil SCGs for a Site w/ an IC & SMP.	In the soil cover/cap or as backfill within the area of the site subject to the IC.	Not Allowed, unless going to a site with IC subject to a 6 NYCRR Part 360 Beneficial Use Determination (BUD).
Meets Site-Specific Background Soil Levels.	Without restrictions. (Does not apply to sites in the BCP.)	Not Allowed, unless going to a site with IC subject to a 6 NYCRR Part 360 BUD.
Site-specific cleanup goals for subsurface soil	Placement below the soil cover/cap within the area of the site subject to the IC.	Not Allowed, unless going to a site with IC subject to a 6 NYCRR Part 360 BUD.

5. Material other than soil imported to a site. The following material may be imported, without chemical testing, to be used as backfill beneath pavement, buildings or as part of the final site cover, provided that it contains less than 10% by weight material which would pass through a size 80 sieve and consists of:

i. gravel, rock or stone, consisting of virgin material from a permitted mine or quarry; or

ii. recycled concrete or brick from a DEC registered construction and demolition debris processing facility if the material conforms to the requirements of Section 304 of the New York State Department of Transportation *Standard Specifications Construction and Materials Volume 1* (2002).

6. The remedial party must provide documentation of the source of fill to DER for approval of the source of the material before it is used on the site, which should include:

i. the name of the person providing the documentation and relationship to the source of the fill;

ii. the location where the fill was obtained;

iii. identification of any state or local approvals as a fill source; and

iv. if no prior approval is available for the source, a brief history of the use of the property which is the source of the fill.

7. Bills of lading should be provided to DER to document that the fill delivered was from a DER-approved source(s).

8. For all remedial programs except those developed pursuant to the BCP, DEC may issue a

site-specific exemption for one or more of the requirements set forth in this section, based upon site-specific conditions, such as:

i. use and redevelopment of the site;

ii. depth of the placement of the backfill material relative to the surface or subsurface structures;

iii. depth of the placement of the backfill material relative to groundwater;

iv. volume of backfill material;

v. potential for odor from the backfill material;

vi. presence of historic fill in the vicinity of the site;

vii. DEC-issued beneficial use determination, pursuant to 6 NYCRR Part 360; or

viii. background levels of contamination in areas surrounding the site.

9. For remedial programs pursuant to the BCP, DEC can only provide a site-specific exemption for backfill consistent with the provisions of paragraph 8 above as follows:

i. for Track 2 and Track 3 cleanups, for soils greater than 15 feet below ground surface; or

ii. for Track 4 cleanups, for soils beneath buildings, pavement and other improvements or for soils beneath the soil cover system or soil cap over exposed surface soils.

10. Sampling fill imported to or exported from a site. The remedial party will sample and analyze the fill being imported to the site in accordance with this subdivision and Table 5.4(e)10. Samples of the fill will be collected based on the soil quantity and type of constituents identified in the table and will be a combination of discrete and composite samples, handled as follows:

i. for VOCs only, grab samples are allowed. These grab samples are one or more discrete samples taken from the fill, with the number as specified in the volatile column of Table 5.4(e)10 for the soil quantity in question, and analyzed for the VOCs identified in Appendix 5; or

ii. for SVOCs, inorganics and PCBs/pesticides:

(1) one or more composite samples are collected from the volume of soil identified in Table 5.4(e)10 for analysis, with each composite from a different location in the fill volume;

(2) each composite is prepared by collecting discrete samples from 3 to 5 random locations from the volume of soil to be tested; and

(3) the discrete samples are mixed, and after mixing, a sample of the mixture is analyzed for the SVOCs, inorganic and PCBs/pesticide constituents identified in Appendix 5.

Table 5.4(e)10 Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

(f) Compliance for soil exported from a site for reuse. For soil that is being exported from a site to locations other than permitted disposal facilities, the handling requirements are set forth in this subdivision and in paragraph 5.4(e)4.

1. Levels of contamination must not exceed the lower of the groundwater and residential use levels as shown in Appendix 5, absent a beneficial use determination issued by DEC. DER will coordinate with the Division of Solid & Hazardous Materials (DSHM), prior to the start of the remedial action, relative to whether the exported soil can be used beneficially in accordance with 6 NYCRR 360-1. The sampling and analysis requirements are set forth in paragraph 5.4(e)10.

2. The number of required samples are specified in Table 5.4(e)10 and paragraph (e)10 above, which may be modified by the DER project manager based on various factors, including the location of the site receiving the soil.

(g) Compliance for the decommissioning of monitoring wells. All monitoring wells not required for site management should be decommissioned in accordance with paragraph (d)6 above prior to DER approval of the FER.

5.5 Underground Storage Tank Closure

(a) The first step for underground storage tank (UST) closure is the identification, removal, treatment, containment and/or stabilization of the contents to prevent contaminant exposure to receptors and to prevent further movement of contaminants through any pathway as set forth herein.

1. A health and safety plan for the site is developed, as described in section 1.9, by a qualified individual in accordance with subparagraph 1.5(a)3.i.

2. Underground tank closures not performed in accordance with this section will require a certification of the closure report by a professional engineer, as described in section 1.5.

3. Minor variances and field adjustments may be approved, in accordance with section 1.6.

4. DEC is required to be notified if a spill is discovered. The notification is made to the Spill Hotline (1-800-457-7362) within two (2) hours of discovery.

5. For more information relative to the technical requirements for closure of a tank, see the applicable DEC guidance document, *Permanent Closure of Petroleum Tanks* (1987/1998/2003).

(b) The procedures set forth in this subdivision should be followed for the closure of all USTs regulated in NYS and any other tank found to have caused a release to the environment.

1. DER must be provided ten (10) days notice prior to the closure of a regulated UST or other tank for which DER oversight is sought or mandated, unless otherwise directed by DER.

2. Provide the petroleum bulk storage modification form required by 6 NYCRR 612.2(d) or for chemical bulk storage tanks 6 NYCRR 596.2(f).

3. A determination must be made whether the tank is to be abandoned in place or removed. Removal of the tank and excavation of associated contamination is the preferred method. Abandonment in place should be considered only when the physical constraints of the site prevent the excavation of an underground tank. Abandonment in place may be prohibited if:

i. local regulations specify removal;

ii. the tank is suspected of having leaked as a result of evidence, including local impacts, inventory records and/or tank test results; or

iii. during the tank closure, grossly contaminated media or groundwater containing product-related contaminants are discovered, in which case, DER will make the determination whether the tank has to be removed for a SC and/or to cleanup contaminated soil.

4. Deactivate or remove the tank and ancillary equipment, if feasible, in accordance with applicable SCGs.

5. A tank closure report should be prepared following the format presented in section 5.8 for a CCR, unless a SC is required in such case it may be included in the SCR.

(c) Site characterization resulting from a tank closure.

1. A SC must be conducted of the tank area if any of the following situations is identified during the tank closure:

i. a tank has evidence of a leak;

ii. DER has made a determination in accordance with subparagraph (c)2.ii below;

iii. all tanks that require a site assessment tank closure by state or federal;

iv. an existing tank is replaced with a new one;

v. a tank has been temporarily out-of-service for more than one (1) year; or

vi. the product stored in the tank is switched from a regulated substance to an unregulated substance.

2. When a SC is being undertaken in conjunction with a tank closure: where the tank:

i. will be closed in place, the SC should be completed before the actual closure; or

ii. is to be removed, the SC should be performed during or after the tank closure.

3. For tank and pipe removals, the following field observations should be made and documented during the SC:

i. a description and photographic documentation of tank and pipeline condition (e.g., pitting, holes or leak points);

ii. the excavation floor and sidewalls should be:

(1) examined for any physical evidence of soil or groundwater contamination;
(2) field screened with an appropriate and properly calibrated field screening tool or kit along transects spaced no more than five feet apart, so that sampling may be biased to the suspected location of greatest contamination; and

iii. if there is no evidence of a discharge, confirmation soil samples for laboratory analysis should be taken to demonstrate that the remaining soils meet SCGs immediately after tank removal if there is:

(1) no groundwater in the excavation, discrete center line soil samples from the bottom of the excavation are required as follows:
(A) at a frequency equal to the total length of the tank in feet divided by five (minimum of one sample);
(B) samples are to be spaced equidistantly;
(C) the outermost samples obtained should be greater than 2.5 feet from each respective end of the tank;
(D) if the total length of a tank in feet is not evenly divisible by five, one additional sample should be obtained for any fraction remaining; and
(E) a minimum of one groundwater sample(s), using a DER approved technique, must be taken within 25 feet hydraulically down gradient from the tanks that are not co-located if the product stored is gasoline and groundwater is within 20 feet of the surface or otherwise requested by DER.
(2) groundwater in the excavation and the contents of the UST have ever had a density less than or equal to water, soil samples should be taken as follows:
(A) one sample biased based upon field screening to the suspected location of greatest contamination should be taken near or above the water table from each excavation sidewall for every 30 linear feet of sidewall (minimum of one sample per sidewall);
(B) for heating oil tanks of 550 gallon capacity or less, one sample biased to the suspected location of greatest contamination may be taken from one excavation sidewall near or

below the water table and one at the bottom of the excavation;

(C) where seasonal fluctuations in the water table elevation can submerge and smear product over a range of several feet, additional samples should be considered in this "smear zone"; and

(D) a sample of the water in the excavation should also be collected pursuant to section 3.7;

(3) groundwater in the excavation and the contents of the UST had a density greater than water, soil samples should be taken as follows:

(A) grab samples should be taken of the excavation at a depth from zero to two feet beneath the tank in accordance with subclause 3.iii.(1) above, across the length of the excavation;

(B) these samples should be field screened with an appropriate tool or test kit;

(C) the four samples with the highest field screening results should be submitted for the appropriate laboratory analysis; and

(D) A sample of the water in the excavation should also be collected pursuant to section 3.7; and

(4) groundwater in the excavation and the contents of the UST consisted of mixed substances, such that some contaminants had a specific gravity of more than one, and some contaminants had a specific gravity of less than one (e.g., No. 6 fuel waste oil potentially contaminated with chlorinated solvents). Samples in this case should be taken pursuant to both clauses (2) and (3) above;

iv. if there is evidence of a discharge, excavation should continue until all contaminated soil is removed or until further excavation is no longer feasible. If excavation is not feasible, *in-situ* treatment may be appropriate. Once excavation is complete and if no groundwater is encountered, confirmation soil samples should be taken to demonstrate that contamination has been removed, as follows:

(1) a minimum of 5 soil samples should be taken, consisting of 4 sidewall and 1 bottom sample for each 15 linear feet of trench;

(2) the samples should be biased based upon field screening toward the suspected location of greatest contamination. If the action is an IRM and contaminated soil would remain in place after excavation and further soil remedial action will occur, refer to section 3.9 for sampling guidance; and

(3) if there is evidence of further contamination, but there is insufficient soil to conduct a soil remedial action, (for example, tank is located in bedrock), or any portion of the tank is located within or immediately above the groundwater table, a groundwater sample should be taken pursuant to subsection 3.7, unless an alternative is approved by DER;

v. if there is any evidence of groundwater contamination, including without limitation, a sheen or odor or if groundwater is within 20 feet of the surface, a groundwater sample should be collected pursuant to subsection 3.7 and soil samples collected in accordance with subparagraph iv above; and

vi. in all cases, a description of product type and quantity spilled from a tank or tank system during excavation.

(d) Tanks abandon in place. For a tank to be abandoned in place, the tank should be deactivated

pursuant to paragraph (b)3 and above must comply with the closure requirements of 6 NYCRR 613.9.

1. As part of the closure of a tank abandon in place, after it is cleaned of any residuals:

i. the tank should be inspected and any areas of questionable integrity including, without limitation, any cracks or corrosion or evidence of discharge, should be documented. Photographs should be submitted to document that the integrity of the system has not been breached, if the evidence is clearly visible in the photograph;

ii. soil sampling should be conducted by completing borings through the bottom of the tank, as follows:

(1) along the centerline, at a frequency equal to the total length of the tank divided by five (minimum of one sample);
(2) the samples should be collected to a depth of 10 feet below the tank bottom, to groundwater or bedrock;
(3) the samples should be spaced equidistantly with the outermost samples obtained no greater than 2.5 feet from each respective end of the tank; and
(4) if the total length of a tank is not evenly divisible by five, one additional sample should be obtained for any fraction remaining;

iii. if groundwater has been determined to be in contact with the tank , or if the product stored is gasoline and groundwater is within 20 feet of the surface, and there is no evidence of a discharge, sampling should be conducted in accordance with paragraph 3.9(a)4; and

iv. tank abandonment should comply with any state, federal and local laws, regulations and ordinances.

2. If the underground storage tank is located under a permanent structure or is physically inaccessible or a certification is submitted, signed and sealed by a licensed New York professional engineer, stating that the sampling requirements of subparagraphs 1.ii through iv, above, for closure of the underground storage tank will cause damage to an adjacent structure, an alternate method for documenting the integrity of the tank may be submitted for DER approval pursuant to subdivision 1.6(d).

5.6 Institutional Controls

(a) When an institutional control (IC) is required by the site decision document to restrict activities on the site or protect the engineering controls and/or current and future users from environmental contamination, the remedial party is responsible for ensuring that an IC is placed on the site. The necessary process should commence during the remedial design phase so that the IC will be in place in time to allow for timely approvals of submissions for which the IC is a prerequisite and to otherwise avoid delaying project completion.

1. The IC will be in the form of:

i. an environmental easement, pursuant to Title 36, Article 71 of ECL, for the programs identified in paragraphs 1.2(b)1 through 3 and 6;

ii. a deed restriction for the program identified in paragraph 1.2(b)4; or

iii. any other DEC-approved mechanism.

2. When an institutional control is required, documentation is to be submitted to DER establishing that the remedial party has notified the site contact list of the intent to establish the institutional control. This notification should describe the:

i. type and areal extent of the contamination to be addressed by the institutional control;

ii. proposed remedial action and its projected duration; and

iii. limitation on site use that will be necessary based on the proposed remedial action.

3. Templates for the environmental easement and deed restriction are available on the DEC website identified in the table of contents.

(b) Environmental easement. An environmental easement is an institutional control that is used to impose land use limitations or requirements needed to protect current or future users from environmental contamination. Activities or uses that may be limited or required include prohibition of use of groundwater for potable purposes, restrictions on property uses, prohibition of certain uses of sites such as construction of basements or trenches, and/or operation or maintenance of engineering controls and reporting.

1. The easement will reference the SMP to be approved by DER and at a minimum:

i. identify the allowable use(s) of the site;

ii. identify any groundwater use restrictions, if any;

iii. incorporate the SMP by reference, including a provision for future modifications to addresses changes to the site management requirements; and

iv. set forth the requirements for the periodic certification that the institutional and engineering controls for the site:

(1) remain in place;
(2) are in a DEC-approved form; and
(3) nothing has occurred that would impair the ability of the controls to protect public health and the environment.

2. For an environmental easement to be executed by DEC, the remedial party must provide:

i. a title report, current within 6 months;

ii. a written commitment from a New York State-licensed title insurance company indicating that it will issue the necessary title insurance policy, naming the state as an insured party, upon the recording of the environmental easement;

iii. a metes and bounds description of the site differentiating areas of varying restrictions, if any, required by the remedial program;

iv. a survey of the site, in a form approved by DEC and prepared by a New York State licensed surveyor with current registration or an American Land Title Association (ALTA) standard survey. The survey will:

(1) show the limits of the area of the site subject to the environmental easement relative to the BCP site as identified by the executed brownfield cleanup agreement;
(2) delineate any areas within the site subject to the easement, with differing use or other restrictions; and
(3) be presented so as to allow the metes and bounds description to be matched to the survey;

v. if requested by DEC, a survey endorsement current to within 3 months;

vi. the property owner's agreement to establish and maintain the easement in a form which is expressly made enforceable by the state set out in such form as to be recordable pursuant to Real Property Law Section 291; and

vii. other relevant documentation as specified by DER.

3. After DEC accepts the environmental easement and returns a fully executed document to the remedial party, the remedial party will:

i. file the easement with the recorder of the county in which the site is located within 30 days of execution of the environmental easement by DEC;

ii. provide a copy of the recorded easement to the affected municipalities; and

iii. provide DEC with a copy of the easement, along with a certification by the recording officer that it is a true and faithful copy and a certification that a copy has been provided to the affected municipalities. The institutional control requirement is not fulfilled until this proof of filing is received by DEC.

4. The environmental easement is to be executed prior to DER approval of the final engineering report.

5. When the required EE cannot be obtained from the owner of the site, DER may elect to execute and record an environmental notice, in accordance with subdivision (d)below, which will then be included in the SMP for the site.

(c) Deed restriction. A deed restriction should identify the restrictions and requirements for the use of the site as set forth in the SMP necessary to assure the continued protectiveness of the site remedy.

1. A deed restriction should, at a minimum identify:

i. the allowable use(s) of the site;

ii. any groundwater use restrictions, if any;

iii. incorporate the SMP to be approved by DER by reference, including, a provision for future modifications to addresses changes to the SMP requirements; and

iv. set forth the requirements for the periodic certification that the institutional and engineering controls for the site:

(1) remain in place;
(2) are in a DEC-approved form; and
(3) nothing has occurred that would impair the ability of the controls to protect public health and the environment.

2. After DEC accepts the deed restriction language, the remedial party will:

i. enter the restriction on the deed with the recording officer of the county in which the site is located within 30 days of DEC approval; and

ii. provide a copy of the recorded restriction to DEC.

3. The deed restriction is to be in place prior to DER approval of the final engineering report.

4. When the required deed restriction cannot be obtained from the owner of the site, DER may elect to execute and record an environmental notice, in accordance with subdivision (d)below, which will then be included in the SMP for the site.

(d) Environmental notice (EN). ENs are informational documents that may be filed with the County Clerk or the Registrar in New York City (NYC). ENs may be used at the discretion of DEC, when an environmental easement or deed restriction cannot be obtained from the owner of a site.

1. The EN will inform prospective purchasers of the property that:

i. contamination exists on the property;

ii. a cleanup occurred at the property, to a level that restricts certain uses of all or part of that property; and

iii. a SMP is available which contains requirements relative to the use of such property.

2. The property owner does not need to approve or sign the EN. DER prepares and records the EN at the appropriate county clerk (or Registrar in NYC).

3. A receipt from the appropriate county clerk (or Registrar in NYC) which will typically consist of a copy of the EN that is stamped with the book and page number in the upper right hand corner of every page of the document including attachments or exhibits, indicating where and when the EN is recorded DER will provide it to the remedial party for inclusion in the SMP.

(e) Templates of the institutional control documents, as well as additional information relative to preparing and recording the institutional controls discussed in subdivisions (b) to (d) above are available on DEC's website identified in the table of contents.

5.7 Remedial Action Schedule and Progress Reports

(a) A projected schedule for the remedial action phase of the project, starting with the procurement process for the construction contractor(s), must be developed prior to the start of construction. This schedule may be required by the remedial design, the remedial action work plan and/or the oversight agreement, as set forth in subdivision 1.2(b). The remedial action schedule should be reviewed and revised during remedial construction, as discussed in paragraph 5.7(b)2 below.

1. The remedial action schedule should incorporate the following:

i. dates for submission of deliverables to DER, such as:

(1) progress reports, groundwater monitoring reports, other monitoring reports (e.g., soil vapor, etc.), post-remediation data reports for individual areas of concern, construction submissions or other construction design reports;
(2) other construction related milestone dates; and/or
(3) other milestone activity dates, such as the start and completion of construction contracts, where multiple contractors are involved;

ii. time frames for the contractor procurement process;

iii. time frames to allow for DER review of deliverables/contractor submission, corresponding revisions of deliverables/submissions per DER comments/recommendations, and DER approvals as appropriate;

iv. time frames/deadlines for

(1) permit applications/issuance; and/or
(2) permit or other authorization equivalent substantive requirement reviews;

v. time lines for obtaining any requisite site access agreements;

vi. dates for finalization of the institutional controls (as described in section 5.6); and

vii. time lines and dates for the preparation and submission of the:

(1) SMP, and
(2) construction completion report (CCR) or FER;

2. The remedial action schedule should identify those tasks, such as specific DER approvals, that are prerequisite to subsequent tasks (sometimes referred to as critical path items).

3. The major assumptions reflected in the remedial action schedule, such as the amount of time it will take for DER to review a given deliverable or how long it will take for a laboratory to turn

around analytical data and to validate the data, should be provided as a note or attachment to the schedule.

4. The remedial action schedule must be consistent with any oversight document between the remedial party and DEC. For example, a consent order may require remedial construction work to start by a specified date. If this is the case, the remedial action schedule must adopt this milestone date and all other prerequisite tasks must allow for compliance with this date.

5. The remedial action schedule should be reviewed and revised, during remedial construction at a frequency acceptable to DER, as set forth in paragraph (b)2 below. For schedule revisions:

i. the details and process for any schedule revisions should be as specified in the oversight document, approved remedial design or approved RAWP; and

ii. the approved remedial action schedule can only be modified by approval of DER.

(b) Periodic progress reports should report on the progress of the remedial actions accomplished during the reporting period and, at a minimum, discuss the items in this subdivision. Unless otherwise set forth, progress reports must be submitted to DER monthly and as soon as practicable before the close of the specified reporting period.

1. Any request for modifications to the approved remedial action work plan must be identified in the progress report, along with the status of the requested modifications.

2. The periodic progress report should include:

i. a discussion of project progress and significant activities during the reporting period, including the status of any requisite permits;

ii. a discussion of pending/planned significant project activities during the next two months, unless another time frame is authorized;

iii. the approved remedial action schedule and proposed modifications to the remedial action schedule, resulting from new information and/or unforeseen conditions;

iv. a discussion of any problems or delays in the implementation of the remedial action relative to the work and/or the remedial action schedule;

v. proposed actions to correct any identified problems, including how to mitigate any adverse schedule impacts; and

vi. any additional, pertinent documentation that is available (e.g., photographs) that helps communicate progress/issues facing the project.

3. If required in a work plan, the following will be provided pursuant to section 3.3:

i. a tabulation of all sample results received during this period pursuant to paragraph 3.14(c)4 and submission of a report summarizing the data and presenting conclusions;

ii. a tabulation of waste classification and/or characterization samples collected including the physical state of the material (solid, liquid, sludge), the volume of material, number of samples collected, analyses performed and results; and

iii. a listing of all types and quantities of contamination generated by the remedial action during the reporting period and to date, as well as the name of the disposal facilities, transporters' dates of disposal and, if appropriate, the manifest numbers of each waste load.

4. Electronic submissions. All required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

5.8 Construction Completion Report and Final Engineering Report

(a) All remedial actions undertaken, including interim remedial actions, will be documented in either a construction completion report (CCR) or the final engineering report (FER). These reports are to be certified as set forth in section 1.5.

1. A CCR is prepared to document the implementation of any remedial action undertaken as an IRM, a remedy for an operable unit or where multiple contracts constituting a portion of the overall remedial program for a site which is not the final action under the remedial program. The CCRs submitted for a site will be incorporated/referenced in the FER when issued.

2. The FER is prepared to document implementation of the complete remedial program and is a mandatory prerequisite to the issuance of a certificate of completion or closure letter. The FER also includes the necessary FER certification for the remedial program provided in section 1.5. The scope of the FER will vary depending on the manner in which the remedial program was implemented for a site, as follows:

i. only for sites in the BCP, where the RI has resulted in a DEC determination that no action is required, the FER will:

(1) describe the activities completed in accordance with the approved RI work plan; and

(2) provide the FER certification for the remedial program;

ii. one or more IRM(s) were undertaken prior to the issuance of the decision document for the site, which resulted in a DEC determination that no further action is required, the FER will:

(1) summarize the results of all IRM CCR(s);

(2) describe any institutional controls required, including mechanisms to implement, maintain, monitor and enforce such controls. Include data and figures identifying where contamination remains at the site that needs to be addressed in the SMP;

(3) identify the site boundaries and include by reference the SMP; and

(4) provide the FER certification for the remedial program;

iii. only a single remedial action was required to implement the remedy identified by a decision document, the FER will:

(1) summarize the results of all IRM CCR(s);

(2) provide all data and information describing the final remedial action implemented in accordance with subdivisions (b) and (c) below;

(3) include data and figures identifying where contamination remains at the site that needs to be addressed in the SMP;

(4) describe any institutional controls required, including mechanisms to implement, maintain, monitor and enforce such controls;

(5) identify the site boundaries and include by reference the SMP; and

(6) provide the certification for the remedial program; or

iv. multiple IRMs, remedies for multiple operable units (OU) or multiple contracts were undertaken to implement the remedial actions identified by one or more decision documents, which together constitute the overall remedial program for a site, the FER will:

(1) summarize the results of all IRM and remedial action CCR(s);

(2) where more than one OU is involved, the FER must identify each OU and describe how the overall remedial program for the site, including any interim remedial measures, has addressed the OU;

(3) provide all data and information describing the final remedial action implemented in accordance with subdivision (b) below;

(4) include data and figures identifying where contamination remains at the site that needs to be addressed in the SMP;

(5) describe any institutional controls required, including mechanisms to implement, maintain, monitor and enforce such controls;

(6) identify the site boundaries and include by reference the SMP; and

(7) provide the FER certification for the remedial program; and

3. The SMP must be approved and the environmental easement or deed restriction executed prior to DER approval of an FER.

(b) CCR/FER requirements. A CCR, or that portion of the FER which documents the final remedial action at the site, must describe the activities completed in accordance with the approved remedial design or remedial action work plan, in addition to providing the data to support the construction activities completed and a discussion of the items identified below. The FER and CCR are to address the items noted below and be prepared in a format based on available templates on the DEC website identified in the table of contents.

1. A final CCR or FER submitted to DER for approval is to be prepared, stamped, certified and signed by an individual licensed or otherwise authorized in accordance with article 145 of the Education Law to practice the profession of engineering using the appropriate certification provided in Table 1.5.

2. A description of the remedy, as constructed, pursuant to the decision document or IRM work plan;

3. A summary of all remedial actions completed, which includes:

i. a description of any problems encountered during construction and a description of their resolution;

ii. a description of changes to the design documents and a description as to why the changes were made;

iii. quantities and concentrations of contaminants removed or treated;

iv. a listing of the waste streams, quantity of materials disposed and facility where such materials were disposed;

v. boundaries of the real property subject to the environmental easement or deed restriction or other institutional controls; and

vi. restoration actions.

4. A list of the remedial action objectives applied to the remedial action.

5. Tables and figures pursuant to section 3.14 (Remedial Investigation Report) containing all pre- and post-remedial data keyed appropriately so that completion of the remedial action is documented. The figures should clearly indicate the volume of contaminated soil or sediment which was remediated, as well as contamination remaining at the site to be managed by the SMP.

6. A detailed description of the applicable areas of remedial action compliance identified in section 5.4.

7. A detailed report of actual costs including bid tabulations and change orders, if any state funding is provided.

8. "As-built" drawings bearing a NYS professional engineer's stamp and signature on each drawing should be provided, which include:

i. any permanent structures including, without limitation, caps, slurry walls, treatment units, piping and instrumentation diagrams or other remedial structures which will remain in place after completion of the remedial action, as well as document areas of changed conditions or removals, as well as mitigation measures in place to address exposures related to soil vapor intrusion;

ii. all soil removals, indicating the surveyed limits of the excavation and location of all final documentation samples;

iii. all underground storage tank removals. A site plan showing the location, including GPS level of accuracy for latitude and longitude, of the tanks removed or abandoned in place and the extent of any soil removal as per subparagraph ii above; and

iv. any permanent survey markers for horizontal and vertical control needed for site management are to be shown on a site survey prepared by a NYS licensed land surveyor and include with the "as builts".

9. Identification of the applicable institutional controls employed along with a copy of the environmental easement or other institutional controls that apply.

10. For active groundwater remedial actions, the FER should also include figures representative of flow conditions immediately preceding initiation of the remedial action and flow conditions representative of pumping conditions during the remedial action.

(c) The following documentation, as applicable to the project, is to be submitted with the CCR or FER. This information is to be included by reference and provided as an ESD, in accordance with section 1.15, and is not to be included as an attachment or appendix to the CCR or FER.

1. All fully executed manifests documenting any off-site transport of waste material.

2. The approved SMP for the project which is the subject of the report.

3. Results of all analyses, including laboratory data sheets and the required laboratory data deliverables pursuant to sections 2.2 and 2.3 and Appendix 2B.

(d) Additional FER requirements. In addition to complying with the CCR as set forth in subdivision (a) above, an FER must also include the documentation for the remedial program necessary to support the certification requirements of the FER. The certifications are discussed in this subdivision, and the required certification language is provided in section 1.5.

1. For those sites where the decision document for the site, remedial work plan or other document identifies such a time frame, the following certification is to be made: “The data submitted demonstrates that the remediation requirements set forth in the decision document for the site have been, or will be, achieved in accordance with the time frames, if any, in the decision document, or any subsequently approved work plans”. Where this certification applies, the FER must identify the applicable time frame, the data evaluated and discuss how the data supports this certification.

2. For all sites with institutional controls, the FER must:

i. describe any institutional controls required, including mechanisms to implement, maintain, monitor and enforce such controls; and

ii. document that any institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 or any other DEC-approved process, and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded”; and

3. For all sites where a SMP is required, reference the plan.

4. For all sites where financial assurance is required, describe the financial assurance mechanisms.

(e) Certificate of completion (COC). Upon approval of the FER, DEC will issue a COC for the remedial programs identified by paragraphs 1.2(a)1 through 3.

1. Issuance of the COC initiates the site management phase of the remedial program, which proceeds in accordance with the approved SMP developed in accordance with section 6.2.

2. The first periodic review of the site, as set forth in paragraph 6.3(a)1 will be due within

18 months of the issuance of the COC.

3. The schedule for the second and subsequent periodic reviews will be set by DER on a site-specific basis, in accordance with 6 NYCRR 375-1.8(h)(3), as part of the approval of the periodic review.

(f) Closure letters. Upon approval of the FER, DEC will issue a closure letter for the remedial programs identified by paragraphs 1.2(a)4 through 6. A closure letter may be in the form of a no further action determination, a release and covenant not to sue letter or such other letter indicating a remedial party has satisfied the requirements of the applicable oversight document.

1. Issuance of the closure letter initiates the site management phase of the remedial program, which proceeds in accordance with the approved SMP developed in accordance with section 6.2.

2. The first periodic review of the site, as set forth in paragraph 6.3(a)1, will be due within 18 months of the issuance of the closure letter

3. The schedule for the second and subsequent periodic reviews will be set by DER on a site-specific basis, in accordance with 6 NYCRR 375-1.8(h)(3), as part of the approval of the periodic review.

(g) Electronic submissions. The CCR/FER and all other required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

This Page Intentionally Left Blank

CHAPTER 6 SITE MANAGEMENT, PERIODIC REVIEW and CLOSEOUT

6.1 Site Management

(a) Site management overview. Site management is the last phase of a remedial program, which begins with the issuance of the COC or closure letter. The purpose of site management is to ensure the safe reuse of properties where contamination will remain in place and is accomplished as outlined by this overview. The success of such use-based cleanups depends on effective site management.

1. Use-based remedies rely on institutional controls (ICs) and engineering controls (ECs) identified as a component of the remedial program. When an EC is required, there will always be a corresponding IC; however an IC (e.g., a groundwater use restriction) does not require a corresponding EC.

2. IC/ECs are implemented by a SMP, developed in accordance with section 6.2, to ensure that the use of the site does not disturb any remaining contamination or the required engineering controls or otherwise compromise the protectiveness of the use-based site remedy.

3. A site will have only one SMP which will encompass all site management activities identified by the remedy or remedies (including IRMs) selected for the site. The only exception would be a BCP site remedial program implemented by a volunteer, where off-site contamination has been determined to represent a significant threat as set forth in 6 NYCRR 375-3.7. For such sites, two SMPs may be applicable:

i. one SMP will address the site management for the on-site remedial program which was completed under the BCP for which the volunteer is responsible; and

ii. a second SMP will address the site management for the off-site remedial program which was implemented either by a responsible party or DER under the SSF.

4. For those sites where the remedial party is not the site owner, both parties can be jointly responsible for ensuring that all site management responsibilities identified in the SMP, environmental easement or deed restriction and the oversight document are performed.

5. Guidance is provided for the design, periodic review and discontinuance (closeout) of the SM phase, which includes:

i. development, implementation and management of the institutional and engineering controls (subsection 6.2.1);

ii. development and implementation of the monitoring requirements (subsection 6.2.2);

iii. design of a plan to operate and maintain treatment, containment, collection or recovery systems, etc. and preparation of an operation and maintenance (O&M) manual (subsection 6.2.3);

iv. periodic review and reporting of the implementation of the SMP, including the IC/EC certification and any corrective actions (section 6.3);

v. termination of treatment system operations (section 6.4); and

vi. completion of the remedial program and closeout of the site (section 6.5).

(b) Interim site management. Monitoring or operation and maintenance activities may need to begin with the completion of an IRM or an operable unit remedy, the COC or closure letter has not yet been issued for the site. For these sites, interim site management in accordance with this subdivision is required.

1. An interim SMP, as applicable for the site, will:

i. comply with the applicable provisions of subdivision 6.2.1(b) for any necessary plans, including a HASP and CAMP;

ii. include necessary monitoring in accordance with the applicable monitoring provisions of subdivisions 6.2.2(a) to (c);

iii. if required, report on the interim SM in accordance with subdivision 6.3(b); and

iv. include applicable excerpts from manufacturer catalogs which describe the equipment, specifications, operation and maintenance procedures, etc. (e.g., equipment catalog-cuts).

2. All applicable interim plans developed in accordance with this subdivision will be incorporated into the SMP upon completion of the remedial program, where any requirement of the interim plan is still required.

3. Periodic reviews and the IC/EC certification, in accordance with section 6.3, will not be required until the COC or closure letter is issued.

4. Exemption to the need for an interim SMP. An interim SMP will not be required where a SMP is not required, in accordance with paragraph 6.2(a)3.

(c) Implementing the SMP. As appropriate for the site remedial program, implementation of the SMP should include the activities described below which are necessary for the proper and effective management of the remedial program.

1. Inspection. Inspections of the site must be conducted to assure the remedy remains in place and effective. Inspections by the person responsible for the site management should:

i. occur at a frequency set forth in the SMP with inspection reports submitted with the PRR, as noted in paragraph 6.3(b)10, unless:

(1) a change of use, pursuant to 6 NYCRR 375-1.11(d), is identified by the inspection, if this change of use was not previously reported to DER by the person responsible for site management; or

(2) an inspection identifies damage to a component of the engineering controls in place at the site which may affect the effectiveness or protectiveness of the remedy. In such case, it shall be reported to DER as set forth in paragraph 6.1(d)3;

ii. occur whenever a severe condition (e.g., major erosion, flooding) which could affect engineering controls or a breakdown of the treatment or mitigation system occurs; and

iii. be documented on an inspection form developed for the site, to compile sufficient information to document an assessment of compliance with the SMP, including but not limited to:

(1) compliance with all institutional controls;
(2) site conditions, including an evaluation of the condition and continued performance and effectiveness of any engineering controls, including all treatment system(s) or structures associated with the treatment/mitigation systems;
(3) site management activities being conducted, including, where appropriate, performance and effectiveness sampling and a health and safety inspection;
(4) compliance with permits and schedules included in the O&M plan or manual; and
(5) currency of site records.

2. Reporting. The results of all inspections and evaluations for the reporting period identified for the site will be reported in the PRR, with the associated inspection forms provided as an electronic submission in the EDS provided with the PRR.

(d) Site management related notices. In addition to the notice requirements identified in section 1.4, during site management the remedial party or the site owner is also to provide notice to DEC as set forth in this subdivision.

1. The information detailed in this paragraph is to be provided, in an electronic format in accordance with section 1.15, for any institutional control in place at the time of the initial periodic review and is to be updated if the information changes at any time during the review period, within 30 days of such change. Such notification is to provide the name and contact information of the current person(s):

i. responsible for implementing the SMP;

ii. responsible for providing the PRR for the site; and

iii. knowledgeable of the easement.

2. At least 60 days in advance of a change in the ownership of the site, which constitutes a change in the use of the site pursuant to 6 NYCRR 375-1.11(d) and subdivision 1.4(b) of this guidance, for sites in the programs identified by paragraphs 1.2(a) 1 through 3.

3. If an inspection identifies damage to a component of the engineering controls in place at the site that may affect the effectiveness or protectiveness of the remedy, it shall be reported to DER if it is determined:

i. to be an emergency situation by noon of the following business day, as set forth in subdivision 1.4(d); or

ii. if it is not an emergency situation, within five business days of the inspection.

4. In addition to the scheduled inspections or periodic reporting requirements, if at any time during the reporting period the remedial party identifies the failures of one or more of the engineering controls or non-compliance with one or more of the institutional controls, the remedial party must:

i. notify DER of the identification of such failure(s) or non-compliance, if determined, in accordance with paragraph 3 above;

ii. identify and implement corrective measures in accordance with paragraphs 6.3(a) 6 and 7; and

iii. provide a periodic certification in accordance with the requirements of section 6.3, for the period established by DER in the approval of the corrective measures.

(e) Electronic submissions. The all required plans, notices, reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

6.2 Site Management Plan

(a) Site management plan. Except as provided in paragraph 3 below, a site-specific SMP developed in accordance with this subdivision is required at all sites upon completion of the final remedial action unless the site remedy requires no restrictions. The SMP should provide a general description of the site, the controls in-place as well as a description of the nature and extent of the remaining contamination at the site. Available SMP template will be on the DEC website identified in the table of contents.

1. The SMP must be approved prior to the approval of the FER.

2. The SMP will include, as required for the site remedy, up to three separate plans summarized as follows:

i. institutional and engineering control (IEC) plan. The IEC plan is described in subsection 6.2.1 and is required in every SMP;

ii. monitoring plan. The monitoring plan is described in subsection 6.2.2. This plan is required when it is necessary to monitor and report the performance and/or effectiveness of the remedy; and

iii. operation and maintenance plan. The operation and maintenance (O&M) plan is described in subsection 6.2.3. This plan is required where the remedial program includes the operation and maintenance of a component of the remedy.

3. Exemption to the SMP requirements. For sites where the remedial program is limited in scope, the SMP may be limited to the level of detail equivalent to an interim SMP, as set forth in subdivision 6.1(b). Sites subject to this exemption are those where the remedial program was limited to:

i. tank closures performed pursuant to section 5.5;

ii. for soil vapor intrusion monitoring, or the operation, maintenance and monitoring of

sub-slab soil vapor mitigation and/or point-of-entry treatment (POET) systems on private wells when such systems or monitoring are the only activity undertaken as an IRM. Should other IRMs or another operable unit of the site require an interim SMP, the vapor intrusion monitoring or the operation, maintenance and monitoring of sub-slab mitigation and/or point-of-entry treatment (POET) systems will be included in that interim SMP; or

iii. sites where any elements of site management will be satisfied within 18 months of the start of site management and institutional controls, if any, will also be terminated in this time frame. Should the need for site management extend beyond 18 months, an SMP in accordance with paragraphs 1 and 2 above will be required by DER.

(b) The SMP will be modified to reflect changes or deletions approved by DER in accordance with paragraph 6.3(a)5.

(c) Electronic submissions. The SMP and all other required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

6.2.1 Institutional Control and Engineering Control Plan

(a) An institutional control and engineering control (IEC) plan is required for all sites for which the remedy does not allow for unrestricted use.

1. The IEC plan details the steps and media-specific requirements necessary to assure the institutional and/or engineering controls remain in place and effective. This plan should include:

i. a description of all institutional controls and, if applicable, engineering controls;

ii. the steps necessary for the periodic certification of the institutional and/or engineering controls;

iii. a provision for implementation of an IC and/or EC, in accordance with subdivision (b) below;

iv. any other provisions necessary to identify or establish methods for implementing the institutional and/or engineering controls required by the site remedy; and

v. a provision to add the environmental easement or deed restriction as an appendix to the SMP upon its execution/issuance.

2. The plan should identify those items to be evaluated in order for the IC/EC certification identified in subdivisions (b) and(c) below to be made.

3. The IC/EC plan should identify areas of the site where contamination remains to be manage by the SMP.

(b) The IC/EC plan should include the applicable plans identified by this subdivision.

1. Excavation plan. An excavation plan is necessary where the remedial program for a site or area of a site does not achieve a soil cleanup which allows for, at a minimum, residential use of the

site. This plan should include provisions for the:

i. removal, management and handling of soil encountered during excavation of the site, which exceeds the residential use soil SCGs:

(1) which is removed from beneath a soil cover or site cap;
(2) where subsurface soil exceeds the site-specific soil cleanup objectives; and/or
(3) where soil from the site will be exported from the site [see subdivision 5.4(f)];

ii. handling and quality of the fill brought to the site, for use below the soil cover/site cap or for use above, or as part of, the cover/cap [see subdivision 5.4(e)];

iii. handling of soil removed from the site [see subdivision 5.4(f)];

iv collection, management, handling and treatment of contaminated groundwater resulting from the de-watering of excavations on the site;

v. installation, management and repair of any subsurface utilities or structures at the site, including provisions to allow utilities to work on or near the site without causing any exposure to the public or workers;

vi. health and safety procedures that comply with 29 CFR 1910.120 and subdivision 1.9 (c) and a CAMP are to be followed for all excavations or other activities at the site which may encounter remaining contamination; and

vii. remedial party and/or site owner to provide notification to DER, in accordance with subdivision 1.4(c).

2. Media-specific plans. Media-specific implementation plans including, but not limited to, plans for:

i. fill which is brought to the site for use above the cap during (re)development or use of the site, to be in accordance with subdivision 5.4(e);

ii. treatment to allow the use of contaminated groundwater; or

iii. the evaluation of need and/or installation/operation/monitoring of sub-slab depressurization systems or other mitigation systems to address soil vapor intrusion in newly constructed structures, or where a change in the use in an existing building occurs.

3. Remedy-specific plans. Plans for the installation, inspection and maintenance of a final cap, cover system or other engineering controls.

4. Health and safety plan (HASP) and Community Air Monitoring Plan (CAMP). A summary of the requirements for the development of a HASP as set forth in subdivision 1.9 (c), the CAMP as set forth in Appendices 1A and 1B and an identification of areas of the site where these plans will be required, should be included in the IC/EC plan. Site management activities where a HASP/CAMP will be necessary include:

i. intrusive activities below the soil cover/site cap or in other areas of the site where contaminant levels in remaining contamination exceed or, if no data is available, may exceed, residential use levels;

ii. the decommissioning/removal of monitoring wells or other engineering controls;

iii. implementation of elements of the monitoring plan [see subsection 6.2.2]; and/or

iv. operation and maintenance pursuant to the O&M plan [see subsection 6.2.3].

5. Other plans. As appropriate for the site management of the site, plans to manage unique site-specific human health or environmental exposure impacts identified by the remedy.

(c) Property transfer provisions. The IC/EC plan must identify the provisions for transfer of site management responsibilities upon property transfer, including the notifications required by subdivision 6.1(d) and 6 NYCRR 375-1.11(d).

1. These provisions will include the requirement that the following site management related documentation, up to the point of transfer, be provided to the new owner:

i. a copy of the approved SMP with any updates;

ii. all previously approved PRRs; and

iii. the IC/EC certification, provided by DER to be completed for the next scheduled periodic review.

2. DER must be notified of the fulfillment of the requirements of paragraph 1, upon notification of the change of use or within five business days of the transfer.

3. The date of the change of use notification to DER, and the date of the document transfer to the new owner are to be reported in the PRR for the review period in which the transfer occurs. It must be noted that this PRR reporting requirement does not satisfy the requirement for a notice of transfer of the certificate of completion for a BCP site, in accordance with 6 NYCRR 375-1.9(f).

6.2.2 Monitoring Plan

(a) General. The monitoring plan describes the measures for monitoring the performance and effectiveness of the remedy at a site. The monitoring plan will vary depending on the type of site, monitoring needs, site location and components of the remedy. The plan should include provisions for the evaluation of site information periodically, to confirm that the remedy continues to be effective for the protection of public health and the environment.

1. The monitoring plan should be designed to assess the performance and effectiveness of the remedy in meeting the objectives identified the remedial program and otherwise complying with applicable SCGs. The monitoring plan should also detail the steps necessary to inspect, monitor and report this performance and effectiveness. The plan should identify the requirements for:

i. assessing compliance with any discharge limits established for the site by a permit or permit equivalent;

ii. assessing whether the remedial treatment components, if any, are achieving their performance criteria;

iii. assessing achievement of remedial action objectives;

iv. evaluating site information periodically, to confirm that the remedy continues to be effective protecting public health and the environment;

v. sampling and analysis of appropriate media; and

vi. preparing the necessary reports of the results of this monitoring.

2. For specific remedies, as described in paragraphs (c) 3 through 6 below, the plan may also need to include provision for:

i. evaluating monitored natural attenuation;

ii. plume management monitoring;

iii. fish and wildlife resource monitoring; and

iv. trend analysis.

3. A monitoring plan may not be required for those remediation sites defined in paragraph 6.2(a)3. However, any wells to be monitored for such sites will require analytical results for the contaminants of concern for two sampling events not more than nine months apart, one event during a high groundwater period and one event during a dry period.

(b) Performance monitoring. Performance monitoring is the regular assessment of physical and chemical parameters to determine whether the remedy is performing as designed. Performance monitoring is typically associated with remedies with active treatment systems.

1. A performance monitoring program should include provision for:

i. measuring the area or volume of the media being treated;

ii. sampling the influent, intermediate and/or effluent streams;

iii. measuring static water elevations in wells, to determine groundwater flow paths and to evaluate the performance of in-ground containment or groundwater control structures (e.g., funnel-and-gate system);

iv. measuring parameters to gauge the effectiveness of the collection, mitigation and/or treatment of contaminants (e.g., maintaining a negative pressure under a building, positive pressure within a building, recovering sparged air or achieving the designed groundwater capture zone);

v. measuring the mass of contaminants removed or treated by the remedy and calculating removal efficiency; and/or

vi. evaluating the results of performance monitoring and implementing maintenance and/or system adjustments if the data identifies that the system is not operating properly.

2. Should DER approve the decommissioning or shut-off of any operating system at a site, the performance monitoring of the system is discontinued and deleted from the monitoring plan and/or SMP once the system is decommissioned or permanently shut off.

(c) Effectiveness monitoring. Effectiveness monitoring is the periodic chemical and physical analysis of media of concern to determine and/or confirm that the remedial action objectives are being achieved when compared to data obtained from the investigation, implementation and previous monitoring of the remedy. The remedial design should have identified those aspects of the remedy for which baseline (pre-remediation) conditions and/or for which reference station data (often related to tracking any trends in groundwater, sediment and/or biota) are needed. Effectiveness monitoring requirements for various media are provided in this subdivision.

1. Effectiveness monitoring requirements for groundwater:

i. a network of wells should be designed and monitored over time to assess up-gradient, on-site and down-gradient conditions in the vicinity of the site. The design of the well network may require vertical profiling to determine proper vertical placement, number and length of the screened intervals;

ii. the network of wells is to provide adequate and effective collection points for samples and include all areas of concern, at various depths if appropriate;

iii. groundwater should be characterized as to its temperature, pH, conductivity, turbidity and, where appropriate, indicator parameters for monitored natural attenuation at the site; and

iv. analysis of groundwater samples must include the contaminants of concern that are relevant to the performance.

2. Effectiveness monitoring requirements for surface water, soil, sediment, soil vapor and biota. Monitoring requirements for each of these media should be established on a case-by-case basis. Generally, where biota sampling/monitoring is to be included, baseline monitoring data both on-site and at a reference station are needed. Remedy implementation should not be delayed to gather additional baseline data.

3. Effectiveness monitoring requirements for monitored natural attenuation (MNA). For a remedy with an MNA component, a groundwater monitoring program should be implemented to monitor groundwater plume characteristics, horizontal and vertical contaminant migration and related controlling processes, in accordance with the USEPA guidance for MNA, OSWER Directive 9200.4-17 *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (November 1997).

4. Plume management monitoring (PMM) requirements. PMM requires a comprehensive and dynamic approach to groundwater monitoring. The following elements should be included in the PMM monitoring plan, taking into consideration the extent of the groundwater plume and the potential for impact to human health or the environment:

i. a network of wells, sufficient in scope to monitor the fate and transport of the plume and to identify impacts to sensitive receptors. Each PMM program should be custom designed and adjusted based on observed plume dynamics and predictive modeling using the following, as applicable:

(1) monitoring wells should be placed along the plume and in its projected path based on vertical and horizontal profiling, three dimensional modeling, proximity to sensitive receptors and professional judgment;

(2) multi-level groundwater data should be collected at various locations and depths to track the plume and bracket it vertically; and

(3) data from all monitoring points should be used to calibrate the predictive model to ensure that it truly describes the contaminant plume and to validate the protection of sensitive receptors;

ii. sampling should be conducted on a quarterly basis at monitoring wells associated with PMM for a minimum of eight quarters, including:

(1) at least one well or well cluster in the source area to monitor contaminant concentrations and determine vertical hydraulic gradients;

(2) at least one well or well cluster located down gradient of the source area along the centerline of the plume screened to bracket the plume vertically;

(3) at least one plume fringe monitoring well located at the limit of the plume. The plume limit is defined as an area where contaminant concentrations are below applicable SCGs. This well should be screened spanning the projected depth of greatest concentration based on the observed vertical gradient;

(4) at least one sentinel well or well cluster located beyond the zone of groundwater exceeding applicable SCGs screened across the projected depth of contamination. The sentinel well should be located no closer than three years' travel time of groundwater to the nearest potential downgradient receptor and no further than five years' travel time from the delineated downgradient extent of the contaminant plume;

(5) additional monitoring wells may either be pre-installed along the centerline of the projected plume or immediately (within two weeks) after contaminants are first detected in the downgradient sentinel. The time difference between the projected and observed first detection of contaminant should be used to refine the predictive model. The down gradient distances to successive wells will be adjusted based on the degree of predictive success; and

(6) as the plume moves toward its discharge point, the sampling frequency of upgradient wells may be reduced based upon suitable trend line analysis and higher confidence in the predictive model. Once the plume reaches its discharge point, the monitoring well network may be further scaled back depending on site-specific assurance requirements;

iii. a provision that should the plume reach apparent stability before its point of discharge, the use of MNA in accordance with paragraph 6.2.2(c)3 can be evaluated, as an alternative remedy; and

iv. soil vapor monitoring, as set forth in the most recent NYSDOH guidance document should be used as appropriate.

5. Fish and wildlife resource monitoring requirements. For sites or areas of concern involving impacts to fish and wildlife resources, monitoring may be required after implementation of the

remedy, to evaluate physical, chemical and biological conditions resulting from the initial implementation of the remedy, in addition to monitoring the long-term effectiveness of the remedy. Where applicable, fish and wildlife resource monitoring should include monitoring of:

i. fish and wildlife resources, including photographic documentation;

ii. physical conditions, which may include:

(1) inspection of wetland or other plants installed during site restoration to ensure acceptable growth and survival and for removal of invasive species. Restorative plants which do not meet specified parameters must be replaced. For wetland restorations, a five-year monitoring and replacement period should be included in the monitoring plan;

(2) inspection of stream-bank stabilization measures to ensure proper function after completion of the remedy. Any erosion or slumping of the bank or loss of erosion-control vegetation should be addressed immediately by repair or replacement; and

(3) monitoring of water levels and vegetation in wetlands or water bodies where hydrological conditions were altered as a result of construction; and

iii. chemical and biological post-remedial conditions, which may include:

(1) collection and analysis of fish or other biological tissue to document reduction of contaminant concentrations in the resource;

(2) monitoring macrobenthic populations or other environmental indicators to determine that an unimpacted habitat condition has been achieved or is being maintained;

(3) conducting toxicity testing of soil, sediments or surface waters to determine that a nontoxic condition has been achieved or is being maintained; and

(4) post-remedial observation of the health or behavior of endangered, threatened or special-concern species or rare ecological communities or other populations of concern previously identified at or near the site, to document that there are no lasting effects due to construction activities.

6. Trend monitoring requirements. Trend monitoring is conducted once there is sufficient quality data to develop an understanding of the effectiveness of the remedy in addressing the exposures presented at the site and to begin to identify any trend(s) with regard to the achievement of remedial objectives. Trend monitoring should:

i. include sampling and analysis to define a trend in groundwater, which may require a minimum of four (4) seasonal sampling events and four (4) synoptic water level measurement events of the same wells where statistical confidence is required;

ii. consider if it may be appropriate to sample every fifth quarter, upon approval from DER, where a site has been sampled quarterly for two years and the results do not show any significant contamination or changing trends. This change may allow the remedial party or site owner to evaluate the results of approximately annual sampling with the benefit of evaluating possible seasonal variations;

iii. plot and evaluate the analytical results to identify any trend in conditions and/or to illustrate that remedial action objectives have been met;

iv. consider sampling to establish a trend in surface water, soil, sediment, soil vapor and/or biota. For some sites, a statistical analysis of the data may be considered to establish or verify a

trend. Where required, any statistical analysis should be data-specific and the method used is to be approved by DER prior to data analysis; and

v. where appropriate, provide statistical reliability for biota tissue sampling(e.g., a minimum of five samples of the same species should be collected at each location).

(d) Monitoring work plan. The monitoring plan section of the SMP should include a work plan of a level of detail sufficient to gather the information required for the performance and effectiveness monitoring appropriate for any media to be sampled as part of site management.

1. A monitoring plan should include the:

i. identification of the sampling points;

ii. analytical method(s) protocol;

iii. qualifications of the laboratory;

iii. frequency of sampling;

iv. sample collection protocols;

v. sampling, reporting and quality assurance/quality control requirements pursuant to Chapter 2;

vi. process for reporting and addressing migration of contaminants to sentinel wells or other compliance monitoring points;

vii. protocols for modifying the plan by expanding or removing monitoring points; and

viii. protocols for determining when or if, the required monitoring of media subject to the plan may be terminated.

2. A HASP for the monitoring identified in paragraph 6.2.1(b)4 is required and is to be prepared in accordance with subdivision 1.9(c).

3. The monitoring plan should also include provision for:

i. the inspection and maintenance of groundwater monitoring wells, extraction wells or other permanent compliance monitoring points (e.g., soil vapor probes); and

ii. decommissioning of groundwater monitoring wells, extraction wells or other permanent compliance monitoring points, by the remedial party or site owner:

(1) when DER determines they are no longer necessary for monitoring the remedy; and

(2) in accordance with the procedures set forth in the applicable guidance, CP-43, *Commissioner Policy on Groundwater Monitoring Well Decommissioning*.

(e) Monitoring plan closeout. When the element(s) of the remedial program which require implementation of the monitoring plan is/are no longer required, the SMP can be revised to eliminate the monitoring plan, with DER approval.

6.2.3 Operation and Maintenance Plan

(a) General. The operation and maintenance (O&M) plan of the SMP is applicable when it is necessary to operate and maintain any mechanical or physical components of the remedial program. Such components of the remedial program include: air, groundwater, soil and/or water treatment systems; groundwater or leachate collection and/or extraction systems; gas venting/treatment systems and soil vapor intrusion mitigation measures or other components of the remedial system, including engineered caps and soil covers.

1. An O&M plan:

i. should be developed in accordance with the work plan required by sections 5.2 or 5.3 during the implementation of the remedy; and

ii. may include an O&M manual if proposed by the remedial party/site owner, or required by DER, in accordance with paragraph 3 below, for use by the operator of the treatment, containment, collection or recovery system required by the site remedy. This is generally used where there are complex remedial components.

2. The O&M plan should:

i. be a sufficiently complete description of the steps necessary to allow individuals unfamiliar with the site to operate and maintain the mechanical and physical components of the remedy for the site, including an O&M manual as needed;

ii. include information on considerations for optimization of the systems, in accordance with paragraph 6.4(b)2;

iii. require the collection of data to allow:

(1) the calculation and reporting of contaminant mass recovered, treated, or destroyed by the operating system(s); and/or
(2) to document and report that the system(s) is/are achieving the design performance standards;

iv. include provision for periodic updating during use, to reflect:

(1) changes in site conditions;
(2) the manner in which the remedy is operated and maintained; and/or
(3) optimization or other changes to the system(s); and

v. incorporate the relevant portions of other documents, such as:

(1) manufacturer operation and maintenance manuals, including instructions for operating and maintaining the equipment, equipment catalog-cuts and/or any component- or process-

specific special procedures

(2) specifications from the contract documents, shop drawing or "as built" drawings, pursuant to paragraph 5.8 (b) 8.; and

(3) any applicable requirements of federal, state and local regulations (e.g., building or fire codes, utility requirements).

3. DER may require an O&M manual be developed for a site in the following cases:

i. when the remedy is of sufficient scale and complexity, where it is determined necessary by either DER, the remedial party or site owner to have a document with the level of detail identified in paragraph 2 above;

ii. if a significant number of the documents identified in subparagraph (a)2.v above are necessary for the operation and/or maintenance of equipment located at the site; or

iii. where DER determines a contingency plan is necessary which describes procedures to be conducted in the event of an emergency (e.g., a fire, spill, tank, drum overflow or rupture, severe weather or vandalism) to protect and/or maintain the operation of the remedy.

4. A HASP for the O&M plan is required as identified in paragraph 6.2.1(b)4 and is to be prepared in accordance with subdivision 1.9(c).

(b) O&M plan closeout. When DER determines that element(s) of the remedial program which require the implementation of the O&M plan are no longer required, the SMP can be revised to eliminate the O&M plan.

6.3 Periodic Review

(a) Periodic review. Site management activities will be reported, and the necessary IC/EC certification will be provided on a periodic basis, in a periodic review report (PRR) prepared in accordance with subdivision (b) below.

1. The initial periodic review will be conducted no more than 18 months after issuance of the certificate of completion or closure letter.

2. Subsequent periodic reviews will be annually, unless a different certification period is approved by DER and set forth in the approval letter for the latest periodic review.

3. Only one IC/EC certification is to be filed per site. If the site comprises multiple properties or parcels and/or multiple owners, the remedial parties/owners shall arrange for one PRR and one certification.

4. Evaluation of records and reporting. The PRR is to provide the information necessary to document the basis for the IC/EC certification. To the extent applicable, the site monitoring data, as well as results of the inspections, should be evaluated as part of the periodic review to confirm that:

i. engineering controls, including necessary treatment or mitigation systems and associated institutional controls are in place, are performing properly and remain effective;

ii. the monitoring plan is being implemented;

iii. operation and maintenance activities are being conducted properly; and

iv. based on this review, the remedy continues to be protective of public health and the environment and is compliant with the decision document.

5. Recommendations for the continued need for an EC or IC. The periodic review should evaluate the data gathered to determine whether all ECs and/or ICs identified for the site remain necessary for the continued effectiveness and protectiveness of the remedy. Such changes can only be requested and approved in the context of a periodic review, as follows:

i. any recommendations for discontinuing any element of the SMP, an EC or the continued need for an IC and the basis for the recommendation are documented in the PRR;

ii. if the recommendation is accepted by DER, the next IC/EC certification will be modified to reflect the accepted change; and

iii. if accepted by DER, the SMP is to be updated by the addition of an errata sheet(s) to reflect the change, the reason for the change and the date of DER's acceptance.

6. Inability to provide a periodic certification. In the event that a periodic certification cannot be provided due to a failure of one or more of the institutional and/or engineering controls, or other condition to be certified,, the remedial party will provide DER with the following:

i. timely notification explaining the cause for such failure;

ii. a work plan to implement corrective measures necessary to enable the certification to be made; and

iii. a schedule for implementing the DER-approved corrective measures work plan and for submission of the revised PRR with the required certification.

7. Corrective measures. Corrective measures shall be implemented in accordance with the DER-approved work plan, and upon completion:

i. the periodic certification meeting the requirements of subdivision 6.3(d) shall be submitted by the remedial party; or

ii. where the certification still cannot be made, DER may:

(1) direct that additional corrective measures be proposed in accordance with paragraph 6 above, and implemented in accordance with this paragraph; or

(2) revoke the certificate of completion, release or closure letter issued by DEC, due to this non-conformance/failure of the IC/ECs.

(b) Periodic review report. A PRR is to be prepared for the certification period which summarizes compliance with the SMP, i.e., the IC/EC, monitoring and O&M plans, based on the inspections in conducted in accordance with paragraph 6.1(c)1 and the periodic review detailed in subdivision (a)

above.

1. The PRR is to be submitted at least 45 days prior to the date of the end of the certification period, as determined by DER, and is to include the required IC/EC certification.

2. The PRR must summarize and document an evaluation of all site-related data to support the required elements of the certification identified by subdivision (d) below, and include:

i. the performance and effectiveness of the remedy, including of all treatment units, etc., including identification of any needed repairs or modifications;

ii. any new conclusions or observations regarding the site contamination based on inspections or data generated by the implementation of the site monitoring plan for the media being monitored; and

iii. recommendations regarding any necessary changes to the remedy and/or monitoring or O&M plans.

3. Where applicable, the PRR must summarize the data and/or information collected in compliance with the following:

i. any discharge monitoring data for the certification period with relevant comments and conclusions:

(1) for a SPDES or air permit, reports are to be submitted to DER as stated in the permit requirements, or
(2) if a permit was not required, equivalent discharge monitoring reports are to be submitted to DER;

ii. comments, conclusions and recommendations based on an engineering evaluation of the information included in the report must be prepared by a professional engineer in accordance with section 1.5, where engineering controls, that are components of the remedy, may require such analysis; and

iii. comments, conclusions and recommendations based on an evaluation of the information in the report where institutional controls exist, prepared by a qualified person pursuant to subdivision 1.5.

4. Where the O&M plan identifies the need for monthly, quarterly or biannual reports of performance monitoring, the PRR should include and summarize the following:

i. a description of the on-line performance of the treatment system(s), if present, which includes the:

(1) number of days the system was run for the reporting period, or percentage of run time for the reporting period if the system is to operate continuously;
(2) volume processed per time period and the cumulative total processed for the reporting period; and
(3) average, high and low flows per day;

ii. the mass of contaminants removed, or removed by each system (e.g., SVE systems, air-sparging systems, or groundwater treatment systems);

iii. a description of routine maintenance and inspection forms;

iv. a description of breakdowns and/or repairs, with an explanation for any significant downtime;

v. a summary of the performance monitoring conducted;

vi. any optimization performed, in accordance with paragraph 6.4(b)2 above;

vii. comments, conclusions and recommendations based on an evaluation and resolution of performance problems; and

viii. all field data (e.g., vacuum and pressure readings, PID readings).

5. A PRR must include a figure showing:

i. sampling and well locations, with tabulated significant analytical values at sampling locations, where effectiveness monitoring is performed;

ii. groundwater plume contours and flow directions; and/or

iii. the area of influence/radius of capture of a treatment system.

6. A PRR must document a change of use, as set forth in paragraph 6.2.1(c)2 and/or a property transfer, as set forth in subdivision 6.2.1(c)

7. A PRR should include any recommendations for modification to the ECs or ICs as set forth in paragraph (a)5 above.

8. The PRR must include cumulative data summary tables and/or graphical representations of contaminants of concern, as follows:

i. include a general listing of all compounds analyzed for, along with the applicable standards; and

ii. provide by sampling point, only those compounds detected, with the minimum reporting and detection limits noted.

9. The results of all analyses, copies of all laboratory data sheets and the required laboratory data deliverables, pursuant to sections 2.2 and 2.3 and Appendix 2B, must be submitted electronically upon the request of DER. This backup data is not to be included in the PRR or as an appendix to the PRR.

10. All inspection reports generated during the period are to be provided electronically.

11. Electronic submissions. The PRR and any required reports and/or documentation must be provided in an electronic format in accordance with section 1.15, using template(s) which may be available on DEC's website identified in the table of contents.

(c) Person providing the IC/EC certification. The PRR documents the basis for the person identified by this subdivision to provide the necessary IC/EC certification for the site.

1. The person responsible for preparing and certifying a PRR can be a qualified environmental professional (QEP), as defined in paragraph 1.3(b)49, unless:

i. an engineering evaluation of monitoring or operational data is necessary to certify the effectiveness of an engineering control; hence a P.E. certification is required. For instance, the certification that a soil cover or site cap remains effective by inspection could be provided by a QEP, while an engineering evaluation of settlement measurements for a composite cap to determine whether a liner may be breached would require a professional engineer's certification; or

ii. the reevaluation of design parameters or a redesign of an engineering control is necessary based on review of the data, before the certification can be made; therefore a P.E. certification is required.. For instance, certification of a system's effective operation based on monitoring data, such as manometer readings supporting a vacuum created by a sub-slab depressurization system, could be certified by a QEP, while an analysis of data or redesign of a system in response to a finding that it was not effective would require an engineering evaluation and certification by a professional engineer.

2. When the engineering controls and/or monitoring components of a remedy are no longer required and the certification relates solely to land or groundwater use restrictions, the certification may be made by a QEP or, alternatively, the site property owner may certify in instances where the certification relates solely to land or groundwater use restrictions.

(d) The institutional control and engineering control (IC/EC) certification for a site is provided in the PRR. The certification is made after an evaluation of the ability of the plans developed in accordance with section 6.2 to maintain the continued effectiveness of the institutional and/or engineering controls for the site.

1. The IC/EC certification is to be in the forms provided in paragraphs 1.5(b)5 or 6, submitted and certified as set forth in 6 NYCRR 375-1.8(h)(3)(i). The person certifying will depend upon the scope of the IC/ECs subject to the certification. Additional guidance regarding the appropriate certifying person is provided in Table 1.5.

2. The IC/EC certification must identify any IC/ECs required by the remedy and certify that:

i. any inspection of the site to confirm the effectiveness of the institutional controls and/or applicable engineering controls required by the remedial program was performed under the direction of the person making the certification;

ii. the IC/ECs employed are unchanged from the previous certification and:

(1) are in place and effective;
(2) are performing as designed; and

(3) nothing has occurred that would impair the ability of the controls to protect the public health and environment.

iii. nothing has occurred that would constitute a violation or failure to comply with any SMP for such controls;

iv. access continues to be available to the site to evaluate such controls;

v. the PRR and all attachments (or the inspections/evaluations necessary to make this certification) were prepared under the direction of, and reviewed by, the person making the certification;

vi. to the best of their knowledge and belief, the work and conclusions described in the certification are in accordance with the requirements of the site remedial program; and

vii. the information presented is accurate and complete.

3. For a site where a financial assurance mechanism is required, the PRR should include an evaluation of the mechanism to assure that it remains valid and sufficient for its intended purpose, to support the certification provide in paragraph 1.5(b)5.

4. For BCP sites that DER has determined do not constitute a significant threat but where contaminants in groundwater contravene drinking water standards at the site border, in accordance with 6 NYCRR 375-3.8(h)2, the PRR will also evaluate groundwater conditions. The IC/EC certification for such sites will also:

i. certify that no new information has come to the remedial party/site owner`s attention, since the last certification, to indicate that the assumptions made in the qualitative exposure assessment of offsite contamination are no longer valid. This includes data from groundwater monitoring wells located at the site boundary if any; and

ii. every five years, in addition to certifying the information in subparagraph i above, also certify that the assumptions made in the qualitative exposure assessment remain valid.

5. When IC’s and EC’s are no longer necessary, DEC may terminate the need to provide the certification in paragraph 4 above:

i. upon a request in writing to DEC with documentation to support such request; and

ii. after notice to the site contact list and a public comment period of 30 days.

6.4 Remedial Process Closure Requirements

(a) A remedial process is considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. When this occurs, the remedial party or site owner may by the submission of a PRR, in accordance with paragraph 6.3(a)5, propose that a treatment system be shut down and/or monitoring of a groundwater and/or soil vapor plume can be terminated.

1. System closure is initiated when the remedial action objectives for the site, including compliance with SCGs, have been satisfactorily achieved. If compounds without applicable SCGs are identified, they would be evaluated on a case-by-case basis.

2. Dependent on site-specific considerations, site closure may be initiated before the SCGs have been met, with prior DER approval, when it can be demonstrated, as appropriate for the site contaminants that:

i. the remedy has achieved the bulk reduction of groundwater contamination, as set forth in subdivision 4.1(d); and

ii. it would not be feasible to continue operation of the remedy, provided:

(1) the remedy has been properly implemented;
(2) it has been optimized to its fullest extent; and
(3) it could not be otherwise modified to improve or achieve the required performance; and

iii. in no case should site closure be considered if the site remains a threat to public health and the environment or it will create a public health exposure or environmental impact, unless the human exposure or environmental impact can be mitigated by another means.

3. Remedial process closure requirements are included in this section for the following:

i. remedial groundwater treatment systems in subdivision (b) below;

ii. monitored natural attenuation in subdivision (c) below;

iii. plume management monitoring in subdivision (d) below; and

iv. drinking water treatment systems in subdivision (e) below.

4. Mitigation or monitoring actions associated with soil vapor intrusion (e.g., sub-slab depressurization systems) may also be undertaken in accordance with the or the most recent NYSDOH guidance document, *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006) or the most current version with appropriate updates.

5. Closure of one element of the remedial program does not relieve the remedial party or site owner of its obligations to continue site management for other engineering and/or institutional controls, or other SMP obligations.

(b) Shutdown of groundwater treatment systems. A groundwater treatment system can be shut down when it is determined that the RAOs have been met, or that continued operation of a remedial treatment system is no longer effective and the system has achieved a bulk reduction in contamination. Groundwater treatment systems addressed in this subdivision include both systems designed to treat contaminated groundwater and systems to treat soil contamination which is the source of groundwater contamination (see clause (b)2.ii.(2) below).

1. Operation of the system has reached asymptotic removal rates. The need for continued system operation may be evaluated after reaching level asymptotic removal rates. Continued operation and pulsing of the system for a period of time prior to any proposal must confirm that asymptotic groundwater conditions have resulted from the treatment.

2. Shutdown of a system with no specified shutdown criteria. If the remedy has not incorporated specific shutdown criteria for the remedial system, the following methodology is recommended to evaluate whether permanent system shut down conditions have been reached, as follows when:

i. operational data indicates that a remedial system has reached asymptotic removal rates, as discussed in paragraph 1 above, the system should be pulsed (i.e., cycled on and off) for a specified period. Additional data is to be collected to evaluate how the period of inactivity has impacted contaminant concentrations [for example, how does the data compare to pre-shut down conditions, and how did the system react when restarted?]:

(1) an increase in concentrations when the remedial treatment system is re-started indicates that the system may continue to be effective in removing contaminants using a pulsing schedule;

(2) if the post-shutdown removal concentrations are the same as the pre-shutdown concentrations, then the system can be considered to no longer be removing a significant level of contaminants, and it may be appropriate for DER to consider shutdown of the system;

(3) a decrease in contaminant levels in adjacent groundwater monitoring wells during shutdown may also correlate to decreasing levels in the surrounding saturated contaminated soils. This may also be considered by DER in justifying remedial system shutdown; and

(4) decreases in soil vapor concentrations;

ii. the mass of contaminant(s) extracted over time and the groundwater monitoring data are graphically recorded to illustrate the effectiveness of system operation and the influence of pulsing on the system:

(1) a minimum of eight groundwater approved data sets are typically necessary to statistically demonstrate within 95% confidence limits that asymptotic conditions have been reached. Alternative non-parametric statistical tests may be proposed. DER will determine the acceptability of such tests on a case-by-case basis; and

(2) generally, a system treating soil impacting groundwater will not be shut down until:

(A) the contaminant levels in soil samples are near or below the soil cleanup objectives for the protection of groundwater;

(B) groundwater standards have been met at the property line(s); and

(C) contamination levels beyond the site property boundary(s) will no longer be at levels which threaten public health and the environment;

iii. when system performance has reached asymptotic conditions, in accordance with subparagraphs i and ii above, soil samples are to be collected from borings or test pits placed at the source area and/or the property boundaries, as approved by DER, and compared to applicable soil clean-up levels; and

iv. when the treatment system has been operating for its anticipated duration, the remedial action objectives are not met and optimization does not improve system success, an evaluation of alternatives, in accordance with subdivision 4.3(a) should be performed to evaluate possible remedial alternatives to meet RAOs, which may conclude in a justification of no further action.

3. Request for shutdown of a remedial system. The remedial party or site owner may request approval from DER prior to the shut down all or a portion of a remedial treatment system. A request to shut down a system:

i. may be considered when:

(1) the applicable RAOs have been achieved;
(2) it is determined that contaminated groundwater can be discharged without further treatment;
(3) there is no significant downgradient impact, and further groundwater treatment is not necessary; or
(4) there is a report detailing the basis for permanent system shutdown that includes all soil, vapor and groundwater data and pulsing information generated by the above evaluation; and

ii. when undertaking studies to support such report in accordance with subparagraph i above:

(1) DER is to be notified when sampling of the media subject to treatment will occur, with DER provided the opportunity to obtain (a) duplicate sample(s) for independent analysis; and
(2) approval for a permanent system shutdown will only be provided when DER has determined that shutdown conditions have been demonstrated.

4. Considerations for shutdown of a system. It is not appropriate to consider shutting down a system used to control contaminant groundwater plume migration (containment versus remediation), human exposures (e.g., soil vapor intrusion) or environmental impacts based on performance data alone. An understanding of site-specific contaminant fate and transport relative to sensitive receptors is essential for this type of determination.

(c) Monitored Natural Attenuation. The determination that MNA will achieve the remedial goals for the site in a manner that is fully protective of all identified receptors, and that monitoring can be terminated, is to be made in accordance with this subdivision.

1. Continued monitoring/remedial action is required if, based upon the analysis of monitoring data collected in accordance with paragraph 6.2.2(c)4:

i. contaminant levels in the sentinel well exceed the applicable SCGs;

ii. the plume length is shown to be increasing;

iii. contaminant levels for individual contaminants are not decreasing in monitoring well(s) in any area of concern identified for the site; or

iv. sensitive receptors not previously identified are threatened.

2. Proposals to sample the monitoring wells at a decreased frequency for the purpose of monitoring the effectiveness of the remedy may be included in the PRR, in accordance with paragraph 6.3(a)5, and will be considered by DER where:

i. contaminant levels in the sentinel well do not exceed the applicable RAOs at any time during the monitoring program;

ii. contaminant levels detected in the plume or monitoring wells at the edge of the plume are reflective of the contaminant levels predicted by the groundwater flow/contaminant transport model;

iii. contaminant levels above the applicable RAOs remain, but a decreasing trend in the levels is demonstrated in the area of concern monitoring well(s). The decreasing trend should be demonstrated by a DER-approved statistical evaluation which should be applied to each of the individual contaminants detected in each monitoring well; and

iv. groundwater sample data is not averaged for the purpose of statistical validation.

3. Proposals for no further monitoring of the groundwater, may be included in the PRR in accordance with paragraph 6.3(a)5, if:

i. contaminant levels in the sentinel well(s) do not exceed the applicable RAOs at any time during the monitoring program. The sentinel well is a well or wells down gradient from the plume, which act(s) as an early detection for the leading edge of the plume from the site being monitored. This presumes that contaminants transported by groundwater have had sufficient time to reach the well, allowing for sorptive retardation and other hydrogeological processes that may have slowed their migration. A proposal regarding the duration of the monitoring program at the sentinel well made by the remedial party/site owner must be based upon site-specific data;

ii. the contaminant plume length has been demonstrated to be stable or shrinking by groundwater monitoring. This requires concentration versus distance trend analysis with either suitable statistical validation or site-specific information for all identified contaminants of concerns; or

iii. the contaminant concentrations along the centerline of the plume have been demonstrated to be decreasing over time by groundwater monitoring. This requires:

(1) concentration versus time trend analysis, with suitable statistical validation, for all identified contaminants of concern and a demonstration that groundwater standards are met before reaching the point of compliance identified for the site; and

(2) a reliable location of the center line of the plume, as such several multi-level profiles on a transect may be required.

4. A determination in accordance with paragraph 6.3(a)5, that the monitoring detailed in paragraph 6.2.2(c)2 in support of an MNA remedy may be discontinued, does not end any continuing obligation for:

i. monitoring of the groundwater plume or other environmental media pursuant to the SMP;

ii. mitigation and monitoring actions to address exposures related to soil vapor intrusion or POET systems installed in the area of the plume; and/or

iii. other actions that may be required by the SMP to address human exposures or environmental impacts.

(d) Plume Management Monitoring. PMM is typically reserved for contaminant plumes for which no feasible remedial option has yet been identified, where hydraulic control of a groundwater plume is not a feasible option and where the leading edge of a plume is not attenuating in a timely manner and continues to expand.

1. A PMM remedy tracks a plume to the ultimate point of discharge (e.g., a water body) based upon fate and transport modeling and an extensive monitoring well network to determine whether:

i. given enough time and distance, the plume may attenuate by dilution and dispersion and reach apparent stability; and

ii. should stability be confirmed, in accordance with subparagraph 6.4(d)2.i, the PMM approach may be terminated and an MNA evaluation initiated.

2. A proposal, in accordance with paragraph 6.3(a)5, to discontinue PMM is only appropriate under the following circumstances:

i. no further monitoring may be required:

(1) if it has been satisfactorily demonstrated that the contaminant plume is discharging into a body of water with sufficient assimilative capacity to ensure that there is no contravention of surface water standards, threat to fish and wildlife resources, or threat to human health and the environment;

(2) if it has been satisfactorily demonstrated that the plume has reached a stable length beyond which it is incapable of impacting the receptors identified in the decision document. This condition should be demonstrated with a statistically valid and properly calibrated contaminant fate and transport model; or

(3) an MNA exit strategy in accordance with paragraph 6.2.2(c)3 can be evaluated once stability is confirmed; and

ii. the decision that a plume management strategy is no longer acceptable and another remedy is required may occur under the following circumstances:

(1) the predictive model cannot be verified or calibrated with the field data from the monitoring well network;

(2) field data indicates that there is a threat to a receptor identified in the decision document;

(3) a receptor not previously identified is threatened;

(4) the contaminant has degraded to daughter products which threaten a receptor;
(5) an implementable remedy not previously available is identified; or
(6) if monitoring indicates another remedy should be considered, an evaluation of alternatives consistent with subdivision 4.3(a) should be conducted which should evaluate possible remedial alternative(s) to obtain the site RAOs and may conclude with a justification of no further action.

3. A determination, in accordance with paragraph 6.3(a)5, that the monitoring detailed in subdivision 6.2.2(c)3 in support of an PMM remedy may be discontinued does not end:

i. monitoring of the groundwater plume or other environmental media pursuant to the SMP;

ii. mitigation and monitoring actions to address exposures related to soil vapor intrusion SVI or POET systems installed in the area of the plume; and/or

iii. other actions that may be required by the SMP to address human exposures or environmental impacts.

(e) Drinking Water Treatment Systems. The determination that continued operation of a drinking water treatment system is no longer necessary to provide potable water, and the system can be shut down, is based upon the evaluation of system performance set forth in this subdivision and applicable DER guidance. (e.g., DER 24 - *Assistance for Contaminated Water Supplies*).

1. Operation of water treatment systems installed in response to actual or potential contamination of a drinking water supply may be terminated or removed when one or more of the following has/have been achieved:

i. an alternative potable water supply is provided;

ii. the remedial party/site owner has:

(1) identified the source of the contamination;
(2) accurately and completely delineated, with respect to the impacted water supply, the location and direction of the contaminant plume as being away from the treatment systems; and
(3) addressed the source of the contamination with an appropriate remedial action; or

iii. contaminant concentrations in the water supply influent:

(1) remain at or below drinking water standards for four consecutive quarters;
(2) followed by concentrations at or below 50% of the state drinking water standards for four additional consecutive quarters; and
(3) no taste and/or odors are attributable to the site contamination.

2. Sampling frequency and/or duration, in subparagraph (e)1.iii above can be reduced or extended, subject to local regulations, with the approval of DER.

3. The remedial party must provide the request for shut down or removal in writing to DER. The request should include all appropriate documentation supporting a decision for shut down or removal based on one or more of the criteria identified in paragraph (e)1 above.

6.5 Site Closeout

(a) Site closeout occurs when all investigation and/or remediation required for the remedial program has been completed and the institutional and engineering controls are no longer required.

1. The remedial party or the site owner may petition DER, or DER can independently initiate site closeout.

2. Site closeout may be initiated when the conditions of section 6.4 have been met for all remedial processes, including:

i. groundwater treatment systems in accordance with subdivision 6.4(b);

ii. MNA in accordance with subdivision 6.4(c);

iii. PMM in accordance with subdivision 6.4(d);

iv. drinking water treatment in accordance with subdivision 6.4(e);

v. soil vapor intrusion mitigation measures in accordance with the most recent NYSDOH guidance; and

vi. other monitoring or maintenance not listed above has been completed as necessary, on a case-by-case basis.

(b) Final periodic review report. When the conditions noted in subdivision (a) above have been met, site closeout is documented by preparation of the final PRR, in accordance with 6.3(a)5.

1. The final PRR must include sufficient data tables and graphs to illustrate that the requirements of section 6.4 have been satisfied.

2. Site closeout may proceed when it has been determined by DER, in accordance with subdivision 6.3(a)5, that all institutional and/or engineering controls identified for the site are no longer necessary.

3. Upon DER approval of the final PRR, the remedial process can be discontinued, the environmental easement extinguished or deed restrictions removed and the site closed out.

4. Electronic submissions. The final PRR and all other required reports and/or documentation identified by this section must be provided in an electronic format in accordance with section 1.15.

DER-10 Appendices

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

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

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

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

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

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

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

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

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

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

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

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

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

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

Appendix 1C
DEC Permits Subject to Exemption

In accordance with section 1.10, exemptions from the following permit programs may be granted to the person responsible for conducting the remedial programs undertaken pursuant to section 1.2:

Air - Title 5 permits
Air - State permits
Air - Registrations
Ballast Discharge
Chemical Control
Coastal Erosion Hazard Areas
Construction of Hazardous Waste Management Facilities
Construction of Solid Waste Management Facilities
Dams
Excavation and Fill in Navigatable Waters (Article 15)
Flood Hazard Area Development
Freshwater Wetland
Hazardous Waste
Long Island Wells
Mined Land Reclamation
Navigation Law - Docks
Navigation Law - Floating Objects
Navigation Law - Marinas
Non-Industrial Waste Transport
Operation of Solid Waste Management Facilities
Operation of Hazardous Waste Management Facilities
State Pollution Discharge Elimination Systems (SPDES)
Stream Disturbance
Tidal Wetlands
Water Quality Certification
Water Supply
Wild, Scenic and Recreational Rivers

Appendix 2A
The Role of Field-Testing Technologies in Site Investigation and Remediation

Purpose

This Appendix identifies the role of field-testing technologies in the investigation and remediation of contaminated sites and the conditions under which the data generated by the field testing method may be used to make project decisions. While DER encourages the use field-testing technologies, data upon which decisions impacting human health are based must be confirmed by a laboratory certified by the New York State Department of Health (NYSDOH) to analyze environmental samples.

Background

Section 502.2 of the Public Health Law requires the use of accredited laboratories for the analysis of all environmental samples in New York. Laboratories meet requirements in a specific analytical method can become accredited for that method through NYSDOH's Environmental Laboratory Accreditation Program (ELAP). Although field-testing technologies have not been approved through the ELAP, NYSDOH acknowledges the need and benefit of the use of such field-testing technologies in conjunction with ELAP-certified methods.

For purposes of this Appendix, a field-testing technology means any field-deployable tool or technique that provides real-time or near real-time environmental data. Examples include immunoassay or other colorimetric test kits, portable gas chromatography with any of a variety of detectors, x-ray fluorescence analyzers, and direct-sensing, down-hole devices such as the membrane interface probe. Quick turn-around analysis using a modified analytical method at a fixed or mobile laboratory is also considered to be a field-testing technology, unless the laboratory is ELAP-accredited to analyze samples by that method.

Why is the use of field-testing technologies beneficial?

Use of field-testing technologies by skilled technicians, in conjunction with rapid data interpretation and analysis by the project management team, can improve confidence in project decisions while significantly reducing the costs and time needed to investigate and remediate sites. Real-time measurements using field-testing technologies are generally less-expensive and quicker (on a per sample basis) than comparable laboratory analyses, making it feasible to increase the sampling density and improve sample representativeness. More timely and cost-effective decision-making can also result in a site being fully-characterized in one deployment while the sampling team is still mobilized instead of conducting the investigation in several phases over a longer period of time.

Use of field-testing technologies, in conjunction with field-based decision-making, also expedites the preliminary identification of "clean areas" and facilitates the collection of appropriate confirmation and documentation samples from optimal locations for analysis by an ELAP-certified laboratory. Accuracy is increased by ensuring that the right samples are collected in the right locations. Precision is maintained through the analysis of quality control (QC) samples specific to the field-testing technology or method.

Despite these benefits, it is important to recognize the analytical uncertainty and limitations of these methods and that they generally produce data of lower analytical quality than fixed-based laboratories. Some of these field-based methods are not analyte-specific or are only able to provide semi-quantitative data due to relatively high detection limits. The primary benefits of using field-testing technologies are to hasten the site investigative process and improve sample representativeness. Any remaining analytical uncertainty must be managed using ELAP-accredited laboratory analyses.

How should field-testing technologies be used as part of expedited site investigation or the Triad Approach?

The use of field-testing technologies is one part of an expedited site characterization process. This process has also been called the Triad Approach. It combines systematic project planning, dynamic work strategies, and the use of field-testing technologies. Systematic project planning ensures that the goals for the characterization are known prior to the start of the project. A dynamic work strategy allows experienced members of the field team to modify site activities based on results of prior sampling on a near real-time basis. The use of field-testing technologies allows for the generation, review, and interpretation of real-time (or near real-time) data in the field and the continuation of sampling until the investigation objectives are met.

Using the Triad Approach, decisions on where to sample next are based on an evolving conceptual site model that is constantly being updated with data generated in the field. By increasing the number of samples and attaining a higher spatial density, errors attributed to sample representativeness are reduced. Because of the analytical uncertainty inherent in these technologies, the recommended approach is to use field-testing technologies and ELAP-accredited laboratory analyses in a collaborative effort that accounts for both their strengths and weaknesses to improve overall data quality and confidence in decision-making.

What are the requirements for the use of field-testing technologies?

All QC measures specified by the testing method and by the regulatory agencies must be followed to demonstrate that the method is working properly. A standard operating procedure (SOP) must be included in the sampling plan that details the step-by-step procedures to follow and includes all quality assurance parameters (e.g., calibration standards, blanks, duplicates, and matrix spikes). Documentation on the field instruments and methodologies used should also be included that describes its maintenance history and record of calibrations as well as an assessment of the precision, accuracy, and false interferences associated with the test.

Equally as important as following the written procedures is assembling a field team with enough experience, and to select the appropriate test method for conditions specific to the site. Field-testing technologies should only be used by technicians or field analysts that have been documented as being trained and experienced in the use of the specific field-testing equipment. Personnel responsible for making field decisions should also have documented experience developing and refining conceptual site models and collecting representative samples in order to expedite the field investigation phase and improve the project team's understanding of the site. The project work plans therefore should also include the qualifications and training of the field technicians who will be collecting the samples and performing the tests as well as those of the project team leader responsible for making field decisions.

In order to assess the comparability of field-generated results to those of a fixed-based laboratory

(using the same or a different method), spilt samples should be collected and submitted to an ELAP-accredited laboratory for correlation analysis. The number of split samples required in order to demonstrate adequate correlation between field and laboratory results may vary depending on the accuracy of the field-testing technology used, the results of correlation studies at other sites, and media heterogeneity. As a rule, a minimum of ten percent (10%) of all field samples must be split and sent to an ELAP-accredited laboratory for correlation analysis. If less than ten samples are collected, then at least three split sample must be collected for correlation analysis. The correlation is generally considered acceptable if the field-testing results are within thirty relative percent difference (RPD) of the laboratory results. DEC ASP Category A deliverables are acceptable for these correlation samples. There should be no bias in correlation sample selection.

Based on Section 502 of the Public Health Law, data upon which decisions impacting human health are based must be confirmed by an ELAP-accredited laboratory, accordingly confirmation and documentation samples will require analysis by an ELAP-accredited laboratory. The laboratory should be requested to provide DEC ASP Category B deliverables for confirmation sample results. An associated Data Usability Summary Report (DUSR) must be prepared by a qualified and approved data validator and submitted along with the results.

Conclusion

The appropriate use of field-testing technology can lead to more cost-effective site investigation and will lead to sites being investigated and remediated more quickly. The key issues are the selection of the appropriate field method, deployment of the method by well-trained and experienced field personnel, and adherence to standard operating procedures and QC requirements appropriate to the field test method.

Appendix 2B
Guidance for Data Deliverables and the Development of
Data Usability Summary Reports

1.0 Data Deliverables

(a) DEC Analytical Services Protocol Category A Data Deliverables:

1. A Category A Data Deliverable as described in the most current DEC Analytical Services Protocol (ASP) includes:

i. a Sample Delivery Group Narrative;

ii. contract Lab Sample Information sheets;

iii. DEC Data Package Summary Forms;

iv. chain-of-custody forms; and,

v. test analyses results (including tentatively identified compounds for analysis of volatile and semi-volatile organic compounds)

2. For a DEC Category A Data Deliverable, a data applicability report may be requested, in which case it will be prepared, to the extent possible, in accordance with the DUSR guidance detailed below.

(b) DEC Analytical Services Protocol Category B Data Deliverables

1. A Category B Data Deliverable is includes the information provided for the Category A Data Deliverable, identified in subdivision (a) above, plus related QA/QC information and documentation consisting of:

i. calibration standards;

ii. surrogate recoveries;

iii. blank results;

iv. spike recoveries;

v. duplicate results;

vi. confirmation (lab check/QC) samples;

vii. internal standard area and retention time summary;

viii. chromatograms;

ix. raw data files; and

x. other specific information as described in the most current DEC ASP.

2. A DEC Category B Data Deliverable is required for the development of a Data Usability Summary Report (DUSR).

2.0 Data Usability Summary Reports (DUSRs)

(a) Background. The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data with the primary objective to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

1. The development of the DUSR must be carried out by an experienced environmental scientist, such as the project Quality Assurance Officer, who is fully capable of conducting a full data validation. The DUSR is developed from:

i. a DEC ASP Category B Data Deliverable; or

ii. the *USEPA Contract Laboratory Program National Functional Data Validation Standard Operating Procedures for Data Evaluation and Validation*.

2. The DUSR and the data deliverables package will be reviewed by DER staff. If full third party data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later date on the same data package used for the development of the DUSR.

(b) Personnel Requirements. The person preparing the DUSR must be pre-approved by DER. The person must submit their qualifications to DER documenting experience in analysis and data validation. Data validator qualifications are available on DEC's website identified in the table of contents.

(c) Preparation of a DUSR. The DUSR is developed by reviewing and evaluating the analytical data package. In order for the DUSR to be acceptable, during the course of this review the following questions applicable to the analysis being reviewed must be answered in the affirmative.

1. Is the data package complete as defined under the requirements for the most current DEC ASP Category B or USEPA CLP data deliverables?

2. Have all holding times been met?

3. Do all the QC data; blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?

4. Have all of the data been generated using established and agreed upon analytical protocols?

5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?

6. Have the correct data qualifiers been used and are they consistent with the most current DEC ASP?

7. Have any quality control (QC) exceedances been specifically noted in the DUSR and have the corresponding QC summary sheets from the data package been attached to the DUSR?

(d) Documenting the validation process in the DUSR. Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters, including data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed.

Appendix 3A
Records Search Requirements

(a) The first phase of a site characterization (SC) should be a records search based on diligent inquiry. A phase 1 report, prepared prior to a site entering one of the DER remedial programs identified in section 1.2, may be provided in lieu of a records search report, provided it was prepared in accordance with applicable ASTM guidance for preparation of Phase 1 reports. A records search report should include the following:

1. Historical information concerning the site history should be part of the site assessment. Historical information is not required if the investigation is directed at either a specific discharge event (rather than a particular area of concern) or any underground tank or underground tank system unless directed by DEC. The site history should include an evaluation of the following to the extent available from diligent inquiry:

i. site history information from sources including, but not limited to, the following:

(1) Sanborn Fire Insurance Maps;
(2) MacRae's Industrial Directory;
(3) title and deed;
(4) site plans and facility as-built drawings;
(5) federal, State, county and local government offices; and
(6) DEC Geographic Information System;
(7) adjacent property uses

ii. the industrial/commercial site history from the time the site was naturally vegetated or utilized as farmland, including without limitation:

(1) names of all owners and operators;
(2) dates of ownership of each owner;
(3) dates of operation of each operator; and
(4) brief descriptions of the past industrial/commercial usage of the site by each owner and operator;

iii. all raw materials, finished products, formulations and hazardous substances, hazardous wastes, and petroleum products which are or were present on the site, including intermediates and by-products;

iv. present and past production processes, including dates, and their respective water use should be identified and evaluated, including ultimate and potential discharge and disposal points and how and where materials are or were received onsite (for example, rail, truck);

v. all former and current containers, container or bulk storage areas, above and below ground tanks, above and below ground waste and product delivery lines, surface impoundments, landfills, septic systems and other structures, vessels, conveyances or units that contain or previously contained hazardous substances, hazardous waste, and petroleum products, including:

(1) type;
(2) age;
(3) dimension of each container;
(4) location;
(5) chemical content;
(6) integrity (for example, tank test reports);
(7) volume;
(8) construction materials; and
(9) inventory control records to include records of leak detection system inspections, where there is no discharge history;

vi. an interpretation of the aerial photographic history of the site, based on available current and historical color, black and white and infrared aerial photographs (scale 1:17.,000 or less) of the site and surrounding area at a frequency which provides the evaluator with a historical perspective of site activities. The photographic history should date back to 1932 or to the earliest photograph available.

vii. any data or information concerning known discharges that have occurred on the site;

viii. remediation activities previously conducted or currently underway at the site including dates of previous discharges, remedial actions, and all existing sampling data concerning contaminants at the site. If a government agency was involved, the name of the lead government agency, case identification number, and current case status;

ix. all remedies previously approved by DEC in a remedial action work plan or decision document to determine if the remedy remains protective of human health and the environment;

x. all existing environmental sampling data concerning contaminants at the site;

xi. any known changes in site conditions or new information developed since completion of previous sampling or remediation;

xii. all Federal, State and local environmental permits including permits for all previous and current owners or operators, applied for or received, or both, for the site including the:

(1) name and address of permitting agency;
(2) reason for the permit;
(3) permit identification number;
(4) application date;
(5) date of approval, denial, or status of application;
(6) name and current address of all permittees;
(7) reason for denial, revocation or suspension if applicable; and
(8) permit expiration date;

xiii. all administrative, civil and criminal enforcement actions for alleged violations of environmental laws concerning the site, including:

(1) the name and address of agency that initiated the enforcement action;
(2) the date of the enforcement action;
(3) the section of statute, rule or permit allegedly violated;
(4) the type of enforcement action;
(5) a description of alleged violations;
(6) the resolution or status of violation and enforcement action; and
(7) a description of any potential environmental impact which may have resulted from the alleged violation; and

xiv. all areas where non-indigenous fill materials were used to replace soil or raise the topographic elevation of the site, including the dates of emplacement, where reasonably available, paying particular attention to potential areas of concern as identified in section 1.7.

2. The person conducting the records search should conduct a site visit to verify the findings in paragraph (a)1 above. Where site conditions are not already well known, appropriate monitoring instruments such as Organic Vapor Analyers (Photo Ionization Detectors, explosimeters), oxygen detectors and radiation detectors should be used to assure personal safety and assist with SC.

3. Interviews are to be utilized, where appropriate, taking into consideration the following factors relative to who to interview, how and when they should be conducted:

i. interviews with facility personnel (past and present), adjoining property owners, and persons familiar with past activities at the site can be useful in determining if and where hazardous waste/substances, or petroleum products were disposed of at the site and what exposure pathways are likely to be at risk. Information obtained during the interview process can supplement other means used in the investigation. However, if the information is crucial to the determination that hazardous waste/substances or petroleum products were disposed of at the site, the documentation outlined in 3.iv (below) is required;

ii. interviews may be conducted in person, by telephone, email or post;

iii. interviews may be conducted prior to, during or after the site reconnaissance, as convenient to the project manager;

iv. interviews must be documented with the date and signature of the person granting the interview. At the end of the interview the person should read and be asked then and there to sign and date the transcript. In cases where a telephone interview was conducted, the project manager should determine during that conversation if the person is willing to sign his/her statements. If so, the project manager will send a transcript to that person for signature thus verifying the conversation. In the case where the person interviewed is unwilling to sign a transcript, or the consultant, after making a reasonable effort (mailing a transcript with a follow-up letter requesting the return), is unable to obtain the person's signature on the transcript, then this statement should not be used or referenced in the report. The person's name, however should be listed in the references section of the report as being contacted during the investigation;

v. areas of inquiry should include the following:
(1) any pending or past litigation or administrative proceedings regarding hazardous waste/substances or petroleum products on the site;

(2) any notices from any government agency regarding any possible violation of environmental or safety laws;
(3) previous environmental assessments or audits;
(4) environmental permits or registrations;
(5) safety plans, prevention plans, control plans; and
(6) reports describing local hydrogeologic conditions;

vi. people to interview should include:

(1) pertinent DEC and NYSDOH staff;
(2) past owners, occupants and operators, key managers, former employees;
(3) site neighbors; and
(4) local officials, such as elected officials, attorneys, building inspectors; zoning board, planning board, as well as any fire police, health, engineering and environmental DECs; and

vii. evaluation of interview responses should include the following factors:

(1) degree of specificity;
(2) degree of interviewee's knowledge;
(3) degree of interviewee's good faith;
(4) completeness;
(5) documentation; and
(6) corroboration.

(b) The records search report is prepared in accordance with section 3.12.

Appendix 3B
New York State Department of Health
Qualitative Human Health Exposure Assessment

The overall purpose of the Qualitative Human Health Exposure Assessment (or the exposure assessment) is to evaluate and document how people might be exposed to site-related contaminants, and to identify and characterize the potentially exposed population(s) now and under the reasonably anticipated future use of the site. To evaluate if an exposure pathway exists, the exposure assessment must assess the quality, representativeness and adequacy of the available data. For instance, field data quality, laboratory data quality, and sampling designs need to be appropriate to meet data quality objectives (e.g., detection limits and minimum reporting limits must be appropriate for the evaluation of human exposures).

In addition, the qualitative exposure assessment must consider the nature of populations currently exposed or that have the potential to be exposed to site related contaminants both on- and off-site, and must describe the reasonably anticipated future land use of the site and affected off-site areas. To conduct this evaluation, in addition to collection of on-site data, some off-site field investigation to identify and sample any potential areas of contamination in support of the exposure assessment may be necessary.

At a minimum, the exposure assessment must evaluate the five elements associated with exposure pathways, and describe how each of these elements pertains to the site being evaluated. The exposure pathway elements that must be addressed, include:

(1) a description of the contaminant source(s) including the location of the contaminant release to the environment (any waste disposal area or point of discharge) or if the original source is unknown, the contaminated environmental medium (soil, indoor or outdoor air, biota, water) at the point of exposure;

(2) an explanation of the contaminant release and transport mechanisms to the exposed population;

(3) identification of all potential exposure point(s) where actual or potential human contact with a contaminated medium may occur;

(4) description(s) of the route(s) of exposure (i.e., ingestion, inhalation, dermal absorption); and

(5) a characterization of the receptor populations who may be exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway are documented; a potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway is not known. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and can reasonably be anticipated to never exist in the future.

Qualitative exposure assessments that are provided in work plans and reports should include the following summary table to provide an overview of the current and potential exposures for the specific site. Examples of how the assessments should be summarized are included in the table below.

Environmental Media & Exposure Route	Human Exposure Assessment (examples)
Direct contact with surface soils (and incidental ingestion)	• People are not coming into contact because contaminated surface soils are covered with…[pavement, vegetation, gravel, etc.]. • People are not coming into contact because public access …[to the site, to areas with contaminated surface soils]… is restricted by fencing. • People can come into contact if they trespass on the site.
Direct contact with subsurface soils (and incidental ingestion)	• People can come into contact if they complete ground-intrusive work at the site.
Ingestion of groundwater	• Contaminated groundwater is not being used for drinking water, as the area is served by the public water supply. • There are no known domestic water supply wells in the area. • Where needed, treatment systems have been put on private wells to eliminate exposures to concentrations above drinking water standards set for public water supplies. • The public water supply uses groundwater in the area as its source; however, the water is treated and tested by …[village/town/city/water company]… on a routine basis to verify that it meets drinking water standards prior to distribution to area consumers. • People can come into contact if private wells are installed on the property.
Direct contact with groundwater	• People can come into contact if they complete ground-intrusive work at the site.
Inhalation of air (exposures related to soil vapor intrusion)	• A ventilation system has been installed on the on-site building to prevent the indoor air quality from being affected by the contamination. • Ventilation systems have been installed on off-site buildings to prevent the indoor air quality from being affected by the contamination. • A monitoring program is being implemented at off-site buildings to verify that additional actions are not needed to address exposures related to soil vapor intrusion. • A soil vapor intrusion evaluation will be completed …[should the on-site building become reoccupied, if new construction is planned at the site in the future].
Other: [Examples: Direct contact and incidental ingestion of surface water, Direct contact with sediments, Consumption of fish]	• Anyone wading in the portion of the …[water body]… adjacent to the site can come into contact with …[contaminated sediments, surface water].

Appendix 3C Fish and Wildlife Resources Impact Analysis Decision Key	If YES Go to:	If NO Go to:
1. Is the site or area of concern a discharge or spill event?	13	2
2. Is the site or area of concern a point source of contamination to the groundwater which will be prevented from discharging to surface water? Soil contamination is not widespread, or if widespread, is confined under buildings and paved areas.	13	3
3. Is the site and all adjacent property a developed area with buildings, paved surfaces and little or no vegetation?	4	9
4. Does the site contain habitat of an endangered, threatened or special concern species?	Section 3.10.1	5
5. Has the contamination gone off-site?	6	14
6. Is there any discharge or erosion of contamination to surface water or the potential for discharge or erosion of contamination?	7	14
7. Are the site contaminants PCBs, pesticides or other persistent, bioaccumulable substances?	Section 3.10.1	8
8. Does contamination exist at concentrations that could exceed ecological impact SCGs or be toxic to aquatic life if discharged to surface water?	Section 3.10.1	14
9. Does the site or any adjacent or downgradient property contain any of the following resources? i. Any endangered, threatened or special concern species or rare plants or their habitat ii. Any DEC designated significant habitats or rare NYS Ecological Communities iii. Tidal or freshwater wetlands iv. Stream, creek or river v. Pond, lake, lagoon vi. Drainage ditch or channel vii. Other surface water feature viii. Other marine or freshwater habitat ix. Forest x. Grassland or grassy field xi. Parkland or woodland xii. Shrubby area xiii. Urban wildlife habitat xiv. Other terrestrial habitat	11	10
10. Is the lack of resources due to the contamination?	3.10.1	14
11. Is the contamination a localized source which has not migrated and will not migrate from the source to impact any on-site or off-site resources?	14	12
12. Does the site have widespread surface soil contamination that is not confined under and around buildings or paved areas?	Section 3.10.1	12
13. Does the contamination at the site or area of concern have the potential to migrate to, erode into or otherwise impact any on-site or off-site habitat of endangered, threatened or special concern species or other fish and wildlife resource? (See #9 for list of potential resources. Contact DEC for information regarding endangered species.)	Section 3.10.1	14
14. No Fish and Wildlife Resources Impact Analysis needed.		

Appendix 4
FWRIA Part 3
Ecological Effects of Remedial Alternatives

(a) When developing and evaluating remedial alternatives, the following considerations should be incorporated into remedy selection, as appropriate.

1. Has the information collected in the FWRIA Part 1 and 2 been incorporated into the development of alternatives?

2. Have actual or potential adverse impacts to fish and wildlife resources been identified?

3. Have contaminants of ecological concern been identified?

4. Have remedial action objectives been established for the contaminants of ecological concern and the protection of the impacted resources?

5. Have ecologically based cleanup levels been identified and the alternatives evaluated in terms of the ability to meet ecologically based cleanup levels?

6. Have the alternatives been evaluated in terms of the expected reduction in the toxicity or bioaccumulation of contaminants?

7. If human health based or other SCGs are proposed as cleanup levels, will the adverse impacts to fish and wildlife resources be eliminated or adequately mitigated?

8. Have alternatives been evaluated in terms of contaminant-related impacts that would remain after implementation?

9. Does the recommended alternative eliminate or adequately mitigate the adverse impacts to fish and wildlife resources? If not, why not?

10. Have applicable resource related SCGs been identified?

11. Have the alternatives been evaluated in terms of the non-contaminant related effects such as temporary and/or permanent loss of, or damage to the resource during implementation?

12. Has the remedial alternative that best maintains or restores fish and wildlife resources been identified? Has an alternative been included that maximizes the acreage of habitat remediated?

13. Has the need for a post-remedial monitoring program (including biological monitoring) been identified? Is a conceptual monitoring program included which can evaluate the long term effectiveness of the remediation?

(b) The above will be incorporated into the remedy selection report for the site prepared in accordance with section 4.4.

Appendix 5
Allowable Constituent Levels for Imported Fill or Soil
Subdivision 5.4(e)

Source: This table is derived from soil cleanup objective (SCO) tables in 6 NYCRR 375. Table 375-6.8(a) is the source for unrestricted use and Table 375-6.8(b) is the source for restricted use.

Note: For constituents not included in this table, refer to the contaminant for supplemental soil cleanup objectives (SSCOs) in the Commissioner Policy on *Soil Cleanup Guidance*. If an SSCO is not provided for a constituent, contact the DER PM to determine a site-specific level.

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Metals					
Arsenic	13	16	16	16	13
Barium	350	350	400	400	433
Beryllium	7.2	14	47	47	10
Cadmium	2.5	2.5	4.3	7.5	4
Chromium, Hexavalent[1]	1 [3]	19	19	19	1 [3]
Chromium, Trivalent[1]	30	36	180	1500	41
Copper	50	270	270	270	50
Cyanide	27	27	27	27	NS
Lead	63	400	400	450	63
Manganese	1600	2000	2000	2000	1600
Mercury (total)	0.18	0.73	0.73	0.73	0.18
Nickel	30	130	130	130	30
Selenium	3.9	4	4	4	3.9
Silver	2	8.3	8.3	8.3	2
Zinc	109	2200	2480	2480	109
PCBs/Pesticides					
2,4,5-TP Acid (Silvex)	3.8	3.8	3.8	3.8	NS
4,4'-DDE	0.0033 [3]	1.8	8.9	17	0.0033 [3]
4,4'-DDT	0.0033 [3]	1.7	7.9	47	0.0033 [3]
4,4'-DDD	0.0033 [3]	2.6	13	14	0.0033 [3]
Aldrin	0.005	0.019	0.097	0.19	0.14
Alpha-BHC	0.02	0.02	0.02	0.02	0.04 [4]
Beta-BHC	0.036	0.072	0.09	0.09	0.6
Chlordane (alpha)	0.094	0.91	2.9	2.9	1.3
Delta-BHC	0.04	0.25	0.25	0.25	0.04 [4]
Dibenzofuran	7	14	59	210	NS
Dieldrin	0.005	0.039	0.1	0.1	0.006
Endosulfan I	2.4[2]	4.8	24	102	NS
Endosulfan II	2.4[2]	4.8	24	102	NS
Endosulfan sulfate	2.4[2]	4.8	24	200	NS
Endrin	0.014	0.06	0.06	0.06	0.014
Heptachlor	0.042	0.38	0.38	0.38	0.14
Lindane	0.1	0.1	0.1	0.1	6
Polychlorinated biphenyls	0.1	1	1	1	1

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Semi-volatile Organic Compounds					
Acenaphthene	20	98	98	98	20
Acenaphthylene	100	100	100	107	NS
Anthracene	100	100	100	500	NS
Benzo(a)anthracene	1	1	1	1	NS
Benzo(a)pyrene	1	1	1	1	2.6
Benzo(b)fluoranthene	1	1	1	1.7	NS
Benzo(g,h,i)perylene	100	100	100	500	NS
Benzo(k)fluoranthene	0.8	1	1.7	1.7	NS
Chrysene	1	1	1	1	NS
Dibenz(a,h)anthracene	0.33 [3]	0.33 [3]	0.33 [3]	0.56	NS
Fluoranthene	100	100	100	500	NS
Fluorene	30	100	100	386	30
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	5.6	NS
m-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
Naphthalene	12	12	12	12	NS
o-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
p-Cresol(s)	0.33	0.33	0.33	0.33	NS
Pentachlorophenol	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]
Phenanthrene	100	100	100	500	NS
Phenol	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	30
Pyrene	100	100	100	500	NS
Volatile Organic Compounds					
1,1,1-Trichloroethane	0.68	0.68	0.68	0.68	NS
1,1-Dichloroethane	0.27	0.27	0.27	0.27	NS
1,1-Dichloroethene	0.33	0.33	0.33	0.33	NS
1,2-Dichlorobenzene	1.1	1.1	1.1	1.1	NS
1,2-Dichloroethane	0.02	0.02	0.02	0.02	10
1,2-Dichloroethene(cis)	0.25	0.25	0.25	0.25	NS
1,2-Dichloroethene(trans)	0.19	0.19	0.19	0.19	NS
1,3-Dichlorobenzene	2.4	2.4	2.4	2.4	NS
1,4-Dichlorobenzene	1.8	1.8	1.8	1.8	20
1,4-Dioxane	0.1 [3]	0.1 [3]	0.1 [3]	0.1 [3]	0.1
Acetone	0.05	0.05	0.05	0.05	2.2
Benzene	0.06	0.06	0.06	0.06	70
Butylbenzene	12	12	12	12	NS
Carbon tetrachloride	0.76	0.76	0.76	0.76	NS
Chlorobenzene	1.1	1.1	1.1	1.1	40
Chloroform	0.37	0.37	0.37	0.37	12
Ethylbenzene	1	1	1	1	NS
Hexachlorobenzene	0.33 [3]	0.33 [3]	1.2	3.2	NS
Methyl ethyl ketone	0.12	0.12	0.12	0.12	100
Methyl tert-butyl ether	0.93	0.93	0.93	0.93	NS
Methylene chloride	0.05	0.05	0.05	0.05	12

Volatile Organic Compounds (continued)					
Propylbenzene-n	3.9	3.9	3.9	3.9	NS
Sec-Butylbenzene	11	11	11	11	NS
Tert-Butylbenzene	5.9	5.9	5.9	5.9	NS
Tetrachloroethene	1.3	1.3	1.3	1.3	2
Toluene	0.7	0.7	0.7	0.7	36
Trichloroethene	0.47	0.47	0.47	0.47	2
Trimethylbenzene-1,2,4	3.6	3.6	3.6	3.6	NS
Trimethylbenzene-1,3,5	8.4	8.4	8.4	8.4	NS
Vinyl chloride	0.02	0.02	0.02	0.02	NS
Xylene (mixed)	0.26	1.6	1.6	1.6	0.26

All concentrations are in parts per million (ppm)
NS = Not Specified

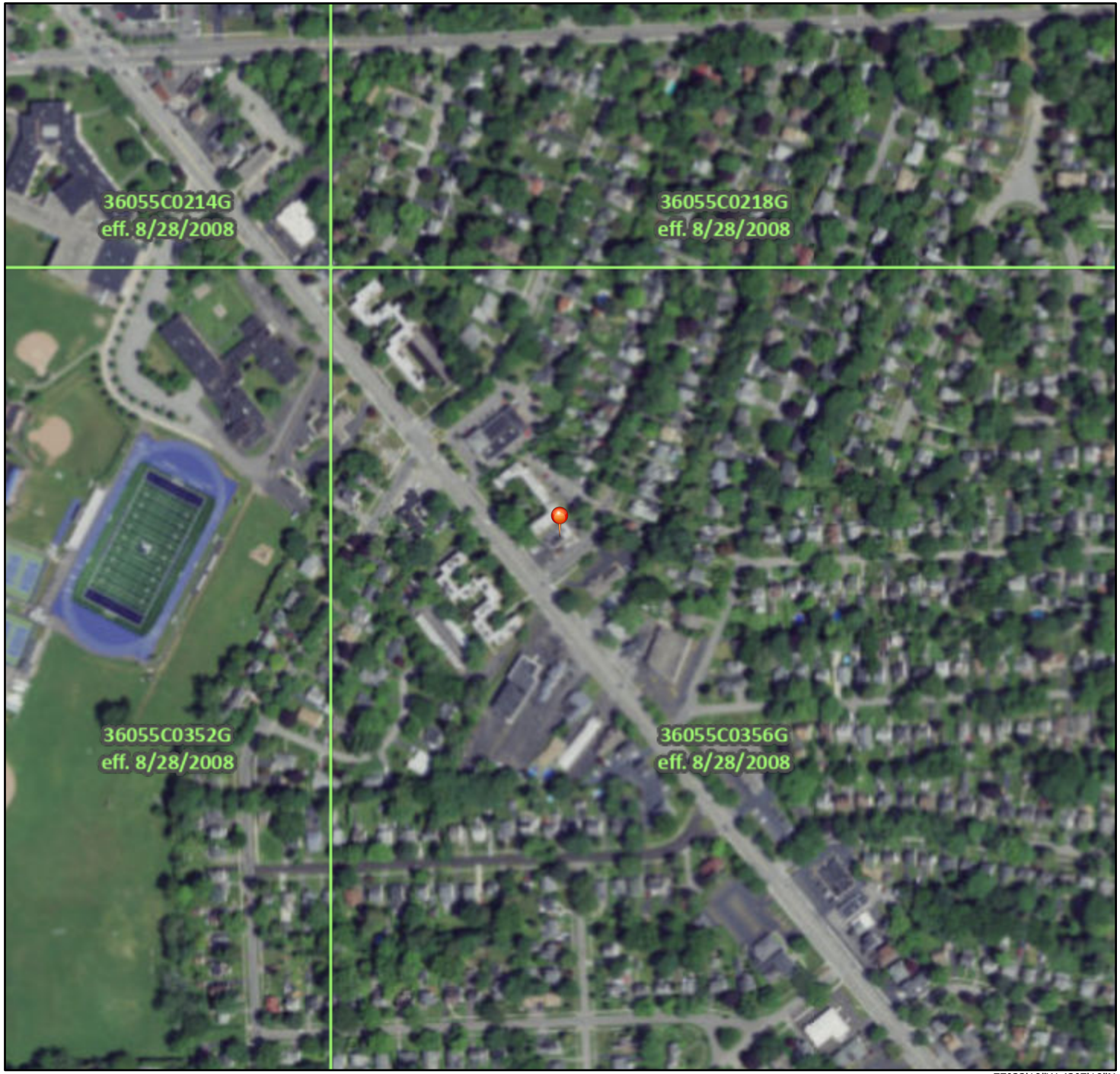
Footnotes:
[1] The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.
[2] The SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.
[3] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.
[4] This SCO is derived from data on mixed isomers of BHC.

APPENDIX D – FEMA FLOOD INSURANCE MAP

National Flood Hazard Layer FIRMette

FEMA

77°33'56"W 43°7'37"N



77°33'19"W 43°7'10"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/27/2022 at 11:35 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX E – HEALTH AND SAFETY PLAN

Site-Specific Health and Safety Plan
Short Form

ut

Site: Carriage/Speedys Cleaners, NYSDEC Site No. 828120/828128 Job #/Task #

Street Address: 2101 and 2150 Monroe Ave, Brighton, NY 14618

Proposed Date(s) of Investigation: March 2021

Prepared by: Jerry Rawcliffe Date: 2/23/2021

*Approved by: Chuck Staples Date:

Site Description: **(see attached map)** Carriage Cleaners and the former Speedys Cleaners are small lots (.35 and .15 acres) approximately 350 feet apart in a topographically flat well-developed area of mixed commercial and residential development.

Comments: NYSDEC – Groundwater Sampling

*Approval also serves as certification of a Hazard Assessment as required by 29 CFR 1910.132

Overall Project Characterization "Color" (See SMARTool Form):

☑ Green ☐ Yellow ☐ Orange 1 ☐ Orange 2 ☐ Orange 3 ☐ Red

Tasks:

Wood	Sub	Task Description	AHA Attached?
☑	☐	Groundwater sampling	☑
☐	☐		☐
☐	☐		☐
☐	☐		☐

High Hazard Activities:

Wood	Sub	Activity	Wood	Sub	Activity
☐	☐	Confined space entry	☐	☐	Operating drill rig
☐	☐	Entering excavations	☐	☐	Operating other heavy equipment
☐	☐	Hot work	☐	☐	Using aerial lift
☐	☐	Lockout/tagout	☐	☐	Working from scaffolding
☐	☐	Operating forklift	☐	☐	Working at heights >6 feet

Stand up for Safety:

The above tasks could expose Wood E&IS employees and subcontractors to hazards associated with the following Stand up for Safety Initiatives:

☑ Driving
☐ Dropped Objects
☐ Energy Isolation (Lockout/Tagout)
☐ Working at Height

Life Saving Rules:

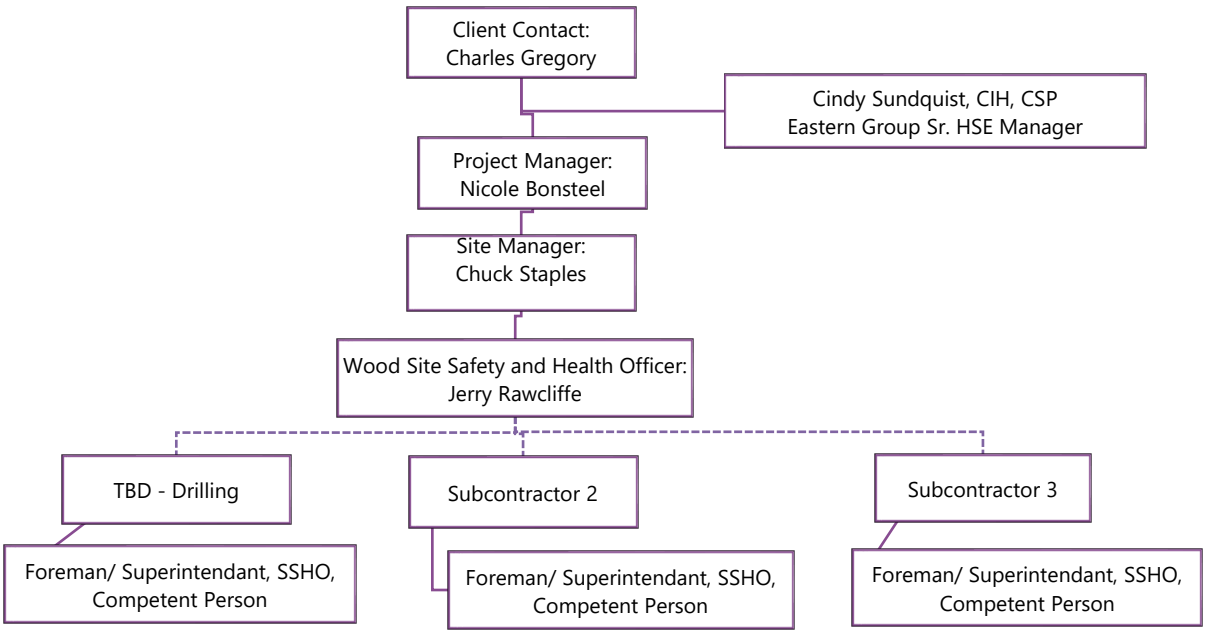
The following Wood Life Saving Rules potentially apply to the work being conducted at the site:

☐ **Bypassing Safety Controls** - Obtain authorization before overriding or disabling safety controls
☐ **Confined Space** - Obtain authorization before entering a confined space

Site-Specific Health and Safety Plan
Short Form

- [x] **Driving** - Follow safe driving rules
- [ ] **Energy Isolation** - Verify isolation and zero energy before work begins
- [ ] **Hot Work** - Control flammables and ignition sources
- [ ] **Line of Fire** - Keep yourself and others out of the line of fire
- [ ] **Safe Mechanical Lifting** - Plan lifting operations and control the area
- [ ] **Work Authorization** - Work with a valid permit when required
- [ ] **Working at Height** - Protect yourself against a fall when working at height

Project Organization Chart:



Dates of Required Training and Medical Surveillance:

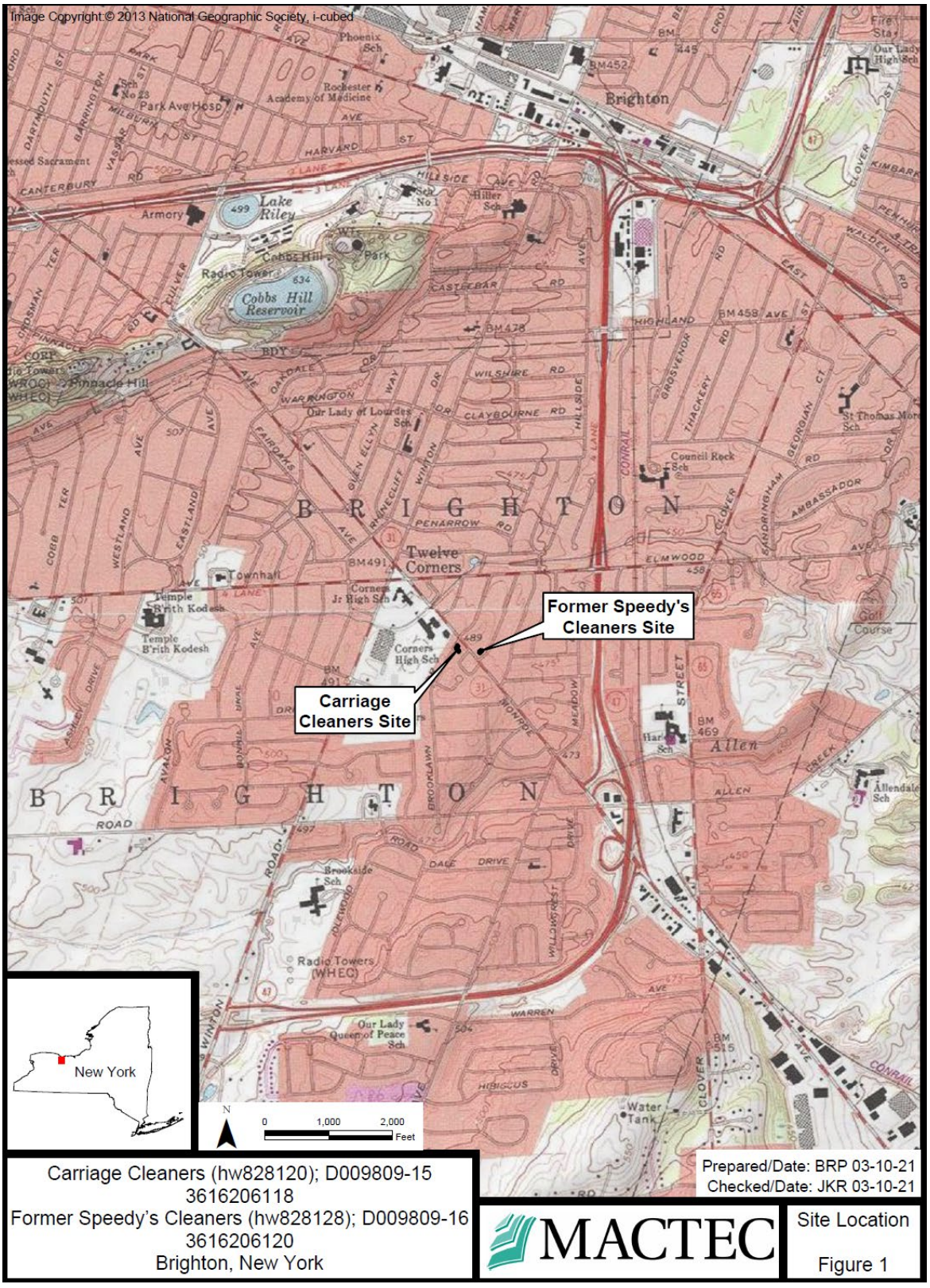
Add additional training topics, as required. **Verify training in online training database: LINK**

Name:	Jerry Rawcliffe	Kaitlyn Chick	Amelia Lyons		
Job duties:	**Field Lead**	**Field Staff**	**Field Staff**		
	Dates	**Dates**	**Dates**	**Dates**	**Dates**
Medical Surveillance	1/19/2021				
-Exam Type (A, B, C)[3]	C				
40-Hour Initial	5/17/1986				
8-Hour Supervisor[2]	9/29/1989				
8-Hour Refresher	2/18/2021				
First Aid[1]	4/12/2020				
CPR[1]	4/12/2020				
Hazard Communication	11/30/2016				
Fire Extinguisher	2/18/2021				

[1] At least one worker must be trained in First Aid/CPR
[2] Required for Site Manager and Site Health and Safety Officer

Site-Specific Health and Safety Plan
Short Form

[3] **Medical Surveillance Exam A has no respiratory clearance so can only be used for Level D PPE.** . Exam A (basic HAZWOPER), Exam B (respirator & HAZWOPER under 40 years old), Exam C (respirator & HAZWOPER over 40 years old), Exam E (DOT), Exam F (asbestos monitoring), Exam G (lead monitoring) etc. **Contact HSE Coordinator or Cindy Sundquist to determine type of exam employee received.**



Site-Specific Health and Safety Plan
Short Form

GOALS/TARGETS:

The following goals/targets have been established for the project:

- [x] Zero OSHA Recordable Incidents
- [ ] Weekly HSE Inspections (documented)
- [ ] Leadership (PM) HSSE Inspections
- [x] HEART observations per day/week/month
- [ ]

Meetings:

The following meetings will be held at the site:

Meeting	Lead by		Frequency				
	Wood	Sub	Initial	Daily	Weekly	Monthly	As Needed
Project Kick-off [1]	☑	☐	☑	☐	☐	☐	☐
Tailgate [2]	☑	☐	☐	☑	☐	☐	☐
Safety Committee [1]	☐	☐	☐	☐	☐	☐	☐
Incident Reviews [1]	☐	☐	☐	☐	☐	☐	☐
E&IS Monthly Safety Topics [1]	☐	☐	☐	☐	☐	☐	☐
HSSE Closeout Meetings [1]	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐

[1] Attended by subcontractor management representative
[2] Attended by all subcontractor employees and supervisors.

Inspections:

Regular inspections will be conducted by Wood E&IS and/or subcontractor personnel. Inspections will be documented, and corrective actions established for all findings. Corrective actions will be tracked to closure. HEART observations will be entered into the HEART database.

Inspection Type	Lead by		Frequency			
	Wood	Sub	Daily	Weekly	Monthly	Before Use
HSE (Visual)	☐	☐	☐	☐	☐	☐
HSE (Documented)	☐	☐	☐	☐	☐	☐
Leadership HSE (e.g., PM)	☐	☐	☐	☐	☐	☐
Scaffolding	☐	☐	☐	☐	☐	☐
Excavations	☐	☐	☐	☐	☐	☐
Heavy Equipment	☐	☑	☑	☐	☐	☐
PPE	☑	☐	☐	☐	☐	☑
Tools/Equipment	☑	☐	☐	☐	☐	☑
HEART/Observations	☑	☐	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Site-Specific Health and Safety Plan
Short Form

Journey Management Plan:

A Journey Management Plan will be developed to address non-routine/non-commute type travel to and from the project site. Considerations will include anticipated weather, work duration prior to travel, travel route, etc. See the Vehicle Travel – Journey Management Plan AHA.

JOURNEY MANAGEMENT PLANNING		
All projects with a field component must have a journey management plan completed for each work location. Complete the below as accurately as possible with your knowledge of the project, site location, time of year, etc. If there are significant changes to the scope of the project, or the conditions of travel, the plan must be updated, or new journey management plan must be completed. ***Not required for city or urban driving***		
	Points	**List Control Measures**
1. How many total hours will the driver have been on duty at the end of the journey? Note: Maximum 14 duty hours permitted. (12+ hours = 10 pts)		
2.		
3. Will the journey require driving in wet, flooded, icy, and/or snowy roads? (Yes = 10 pts)		
4. Will the journey require driving in conditions that limit visibility (dark, fog, snow, hail, etc.)? (Yes = 10 pts)		
5. Will the journey require driving overnight (after 9pm - 5am)? (Yes = 10 pts)765		
6. Is the driver familiar with the route for this journey? (No = 5 pts)	5	
7. How many hours of sleep has the driver had in the past 24 hours? (If < 8 hrs = 5 pts)		
8. Will there be a passenger in the vehicle during the journey? (No = 5 pts)	5	
9. Is heavy traffic congestion expected during the journey? (Yes = 5 pts)		
10. Was a pre-trip inspection performed (walk around, towing, load securement, etc.)? (No = 5 pts)		
11. Is the vehicle towing a heavy or oversized load OR permit required? (Yes = 5 pts)		
12. Will the driver encounter unpaved or mountainous road conditions? (Yes = 5 pts)		
13. In case of emergency, will the driver have suitable means of communication? (No= 5 pts)		
14. Are there elevated security risks associated with this journey? (Yes = 5 pts)	5	Covid Risks
15. Is there an elevated risk of striking an animal on the roadway during this journey? (Yes = 5 pts)		
TOTAL	15	**Low Risk = 0-25 pts, Medium Risk = 30-55 pts requires mitigation, High = 60 or more requires Management Approval**
Workers must also establish a check in/check out system for any project where there is significant driving and where they will not be returning to the office at the end of the day. This process should be documented.		

Known or Suspected Contaminants (include PELs/TLVs): LINK to COC Library

Contaminants of Concern (COC) (Attach Fact Sheets*)	Maximum Concentrations		PEL/TLV**
	Soil (mg/kg)	Water/Groundwater (µg/l)	
Tetrachloroethene (PCE)	NA	380 (CC 2020)	PEL: 100 ppm TLV: 25 ppm
Trichloroethene (TCE)	NA	19 (CC 2020)	PEL: 100 ppm TLV: 10 ppm
Cis-1,1 Dichloroethene	NA	1300 (SP 2016)	PEL: 200 ppm TLV: 200 ppm
Vinyl Chloride	NA	670 (SP 2016)	PEL: 1 ppm TLV: 1 ppm

*Workers must be made aware of the signs, symptoms, and first aid for each COC. Information is located on the COC fact sheets.
**See (LINK) for OSHA PELs and ACGIH TLVs

Air Monitoring Action Levels:

PID/FID Reading[1]	Detector Tube[1]	Dust Meter[1]	LEL[2]/O_2[1]	Action
No VOC monitoring planned – Soils remediated.			>10% LEL	Stop work. Evacuate area. Consider return with ventilation system and spark proof/intrinsically safe equipment.
			<19.5% O_2	Stop work and evacuate area.

[1] Sustained readings measured in the breathing zone
[2] Readings at measured at the source (borehole, well, etc.)

AHAs:

Check and attach all that apply (add applicable AHAs not already listed) **(LINK to AHA Library):**

Activity Specific AHAs:

- [x] Mobilization/Demobilization and Site Preparation
- [x] Vehicle Travel – Journey Management Plan
- [x] Field Work - General
- [x] Decontamination
- [x] Hostile Public Interactions
- [x] Groundwater Sampling
- [x] Travel To / From Office or Project Site During Covid-19 Considerations
- [x] Site Activities During Covid-19 Pandemic
- [ ] Field Work Oversight
- [ ]
- [ ]

Hazard Specific AHAs:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

PPE and Monitoring Instruments:

Initial Level of PPE *

- [ ] Level D
- [x] Modified Level D
- [ ] Level C

* Cannot use Short Form HASP for Level B or A or Confined Space Entry work

Standard PPE

☐ Hard Hat ☑ Safety boots ☑ Safety glasses ☑ High visibility vest/clothing

Eye and Face Protection

☐ Face shield ☐ Vented goggles ☐ Unvented goggles ☐ Indirect vented goggles

Hearing Protection

☑ None ☐ Ear plugs ☐ Ear Muffs ☐ Ear plugs and muffs

Respiratory Protection

☑ None ☐ Upgrade Only ☐ Dust mask ☐ Full Face APR ☐ Half Face APR

Cartridge Type: _____ Change Cartridges: _____

Protective Clothing

☑ Work uniform ☐ White uncoated Tyvek® ☐ Poly-coated Tyvek® ☐ Saranex®

☐ Boot covers ☐ Reflective vest/clothing ☐ Chaps or Snake Legs ☐ Other: _____

Hand Protection

☐ None ☐ Cotton gloves ☐ Leather gloves ☐ Glove liners ☐ Cut-resistant gloves ☑ Other: Nitrile

☑ Outer Gloves: List Type: _____ ☐ Inner Gloves: List Type: _____

Monitoring Instruments Required*

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

- When work begins on a different portion of the site.
- When contaminants other than those previously identified are being handled.
- When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling.)
- When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon.)

☐ LEL/O2 Meter ☐ PID: ☐ 10.0/10.6 eV Lamp ☐ 11.7 eV Lamp ☐ FID ☐ Hydrogen Sulfide meter ☐ Carbon Monoxide meter

☐ Dräger Pump (or equivalent) ☐ Dust Meter: ☐ Respirable dust ☐ Total dust ☐ Other: _____

List Tubes: _____

*Monitoring instruments will be calibrated daily in accordance with manufacturer's instructions. Results will be recorded in the field logbook.

Chemicals Brought to the Site:

List all chemicals brought to the site (e.g., preservatives, decon solutions, calibration gases, gasoline, etc.).

Product Identifier: (Note: Name listed below must match name on label and SDS)	**SDS Attached?**
ALCONOX	☑
HYDROCHLORIC ACID	☑
NITRIC ACID	☑
YSI Buffer Solution pH 4.00	☑
YSI Buffer Solution pH 7.00	☑
ORP Standard 240 mV	☑
Stablecal 10 NTU Standard	☑
Stablecal 20 NTU Standard	☑
Stablecal 100 NTU Standard	☑
Stablecal 800 NTU Standard	☑
Conductivity standard 1412 uS/cm	☑

Chemicals will be kept in their original containers. If transferred to another container, aside from day use by one individual, the new container will be clearly labeled with the name of the chemical (product identifier), signal word, hazard statement, pictogram(s), precautionary statement, and name, address and telephone number of the chemical manufacturer, importer or other responsible party.

Work Zones:

The work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling location. The Contamination Reduction Zone is considered to be the area with in a 20-foot diameter of the sampling location. The Decontamination Zone is to be located upwind of the work area. Work zones will be maintained through the use of:

- ☐ Warning Tape
- ☐ Cones and Barriers
- ☑ Visual Observations

Decontamination Procedures and Equipment:

Note: See Decontamination AHA for further information

Level D Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Boots, and Gloves Wash and Rinse (if worn)	Scrub outer boots, and outer gloves decon solution or detergent water. Rinse off using copious amounts of water.

Station 3: Outer Boot and Glove Removal (if worn)	Remove outer boots and gloves. Deposit in plastic bag.
Station 4: Inner glove removal	Remove inner gloves and place in plastic bag.
Station 5: Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Modified Level D and Level C PPE Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: Canister or Mask (Level C only) Change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5: Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6: Face Piece Removal (Level C only)	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7: Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Site Communication:

- [x] Verbal
- [ ] Two-way radio
- [x] Cellular telephone
- [ ] Hand signals
  - Hand gripping throat _____ Out of air, can't breathe
  - Grip partner's wrist or both hands around waist _____ Leave area immediately
  - Hands on top of head _____ Need assistance
  - Thumbs up _____ OK, I am all right, I understand
  - Thumbs down _____ No, negative

- ☐ Horn
- ☐ Siren
- ☐ Other: _____

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department: Brighton Fire Dept.	911, non-emergency 585-381-3200		
Hospital: Strong Memorial Hospital	585-275-2100		
WorkCare (Early case management)	1-888-449-7787		
Police Department: Brighton Police Deptartment	911, non-emergency 585-784-5150		
	Office	**Cell**	
Site Safety and Health Officer: Jerry Rawcliffe	207-828-3614	207-415-6211	
Client Contact: Charles Gregory	518-402-9813		
Project Manager: Nicole Bonsteel	609-689-2829		
*Eastern and LA Group Sr. HSE Manager: Cindy Sundquist	207-828-3309	207-650-7593 (Cell) 207-892-4402 (Home)	
Corporate SVP of HSE: Vlad Ivensky	610-877-6144	484-919-5175 (Cell) 215-947-0393 (Home)	
EPA/DEP (if applicable):			
Other: Ambulance	911		

*See Incident Flow Chart for additional Group HSE Manager's Contact Information

Emergency Equipment:

The following emergency response equipment is required for this project and shall be readily available:

- [x] Field First Aid Kit (including bloodborne pathogen kit/supplies)
- [ ] Fire Extinguisher (ABC type)
- [ ] Eyewash (Note: 15 minutes of free-flowing fresh water)
- [ ] Other: _____

Emergency Procedures:

- The SSHO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The SSHO notifies the Project Manager and client contact of the emergency.

- If the emergency involves an injury to a Wood employee, the HSE Coordinator or Site Manager are to implement the Wood Early Injury Case Management program. See procedures and Flow Diagram below:
- If applicable, the SSHO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the SSHO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher but only if trained within the past year. Use the **PASS** method (**P**ull the pin, **A**im at the base of the fire, **S**queeze the trigger, use a **S**weeping motion to put out the fire) when extinguishing fires. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE (e.g., level C or B PPE - if available), should be donned. If appropriate PPE is unavailable, site workers should evacuate and call in emergency personnel.
- For chemical spills, follow the job specific AHA and SDS for spill containment and spill handling procedures.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash bottle/station for the eyes and wash affected area. Site worker should shower as soon as possible after incident.
- If the emergency involves toxic gases, workers will back off and reassess. Prior to re-entering the work zone, the area must be determined to be safe, that the required PPE and air monitoring equipment is available. Entry is prohibited if PPE or air monitoring equipment is inadequate.
- An injured worker shall be decontaminated appropriately.
- Within 24 hours after any emergency response, the initial Incident Analysis Report shall be completed and submitted to the Group Sr. HSE Manager. If the injury involves vehicles or overhead/underground utilities, also complete the Vehicle Incident Report (VIR) and Ground Disturbance Report (GDR), respectively. When the use of drugs or alcohol cannot be ruled out as a factor in the incident, contact P&O to determine if post accident drug testing is required.

Wood E&IS Early Injury Case Management Program

NON-EMERGENCY INCIDENT	EMERGENCY INCIDENT
Steps 1 & 2 must be completed before seeking medical attention other than local first aid. 1. Provide first-aid as necessary. Report the situation to your immediate supervisor AND HSE coordinator (all incidents with the apparent starting event should be reported within 1 hour of occurrence). 2. Injured employee:	1. Provide emergency first aid. Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries without prior authorization. Any outside media calls concerning this incident must be referred immediately to Lauren Gallagher at 602-757-3211. 2. Once medical attention is sought and provided, the supervisor must:
Call WorkCare 24/7 Hotline* (888) II-XPRTS or (888) 449-7787	

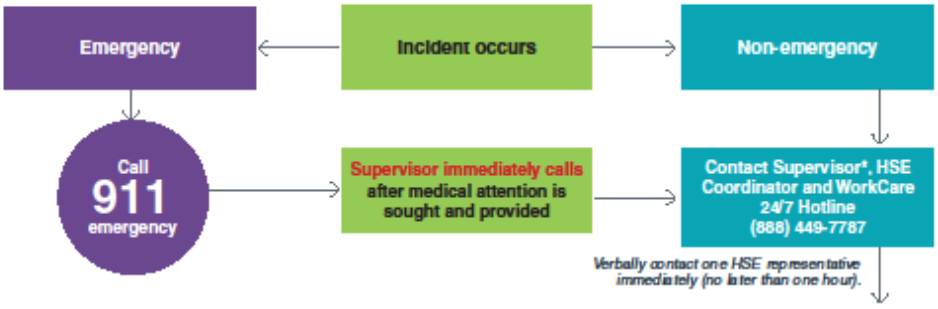
WorkCare will assess the situation and determine whether the incident requires further medical attention. During this process, WorkCare will perform the following: • Explain the process to the caller. • Determine the nature of the concern. • Provide appropriate medical advice to the caller. • Determine appropriate path forward with the caller. • Maintain appropriate medical confidentiality. • Help caller to execute path forward, including referral to the appropriate local medical facility. • Send an email notification to the Corporate HSE Department.	WorkCare will be responsible for performing the following: • Contact the treating physician. • Request copies of all medical records from clinic. • Send an email update to the Corporate HSE Department.
3. IMMEDIATELY after contacting WorkCare send a brief email notification AND inform verbally (direct contact is required) ONE of HSE corporate representatives See Figure 11.3. 4. Make all other local notifications and client notifications. 5. Local Supervisor, HSE Coordinator, SSHO and any applicable safety committees to complete preliminary investigation, along with the initial Incident Report within 24 hours. 6. Corporate Loss Prevention Manager to complete Worker's Compensation Insurance notifications as needed. 7. Corporate HSE to conduct further incident notifications, investigation, include in statistics, classify, and develop lessons learned materials. * - **NOTE: Step 2 is only applicable to the North-American operations and to incidents involving WOOD personnel. High potential near misses, subcontractors' incidents, regulatory inspections, spills and property damages above $1,000 should be reported immediately, following directions from Step 3.**	

Site Specific Emergency Procedures are as follows:

INCIDENT FLOW CHART

Incident flow chart

Call immediately



E&IS Corporate HSE department contact list

Name/email	Office location	Contact information
Bruce Voss bruce.voss@woodplc.com	Cathedral City, CA	760.202.3737 (office) 951.897.6381 (cell)
Chad Barnes chad.barnes@woodplc.com	Phoenix, AZ	602.733.6000 (office) 480.495.9846 (cell)
Cindy Sundquist cynthia.sundquist@woodplc.com	Portland, ME	207.828.3309 (office) 207.650.7593 (cell) 207.892.4402 (home)
Gabe Sandholm gabe.sandholm@woodplc.com	Minneapolis, MN	612.252.3785 (office) 206.683.9190 (cell)
Lori Dowling lori.dowling@woodplc.com	Prince George, BC	250.564.3243 (office)
Philip Neville philip.neville@woodplc.com	Thorold, ON	905.687.6616 (office) 905.380.4465 (cell)
Tim Kihn tim.kihn@woodplc.com	Edmonton, AB	780.944.6363 (office) 780.717.5058 (cell)
Vladimir Ivensky (can call 24/7) vladimir.ivensky@woodplc.com	Plymouth Meeting, PA	610.877.6144 (office) 484.919.5175 (cell) 215.947.0393 (home)
Kirby Lastinger kirby.lastinger@woodplc.com	Lakeland, FL	836-667-2345 x207 (office) 863-272-4775 (cell)
Stephen Paxton stephen.paxton@woodplc.com	Kennesaw, GA	770-499-6842 (office) 678-270-0980 (mobile)
Chris Miele christopher.miele@woodplc.com	Capital Projects - Kirkland, WA	425-368-0946 (office) 425-864-9011 (mobile)

High potential near misses, workplace violence/harassment and security incidents, subcontractor incidents, regulatory inspections, spills, and property damage should be reported immediately to one of the above HSE Representatives.

*Supervisor Responsible For:

- D&A Testing Coordination as per client and Wood E&IS requirements, Local/Client Notifications, and Completing Initial IAR within 24 hours and forwarding to Corporate HSE.

E&IS, North America | Rev. Dec 2017

Field Team Review:

I acknowledge that I understand the requirements of this HASP, and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Routes to Emergency Medical Facilities:

HOSPITAL (for immediate emergency treatment):

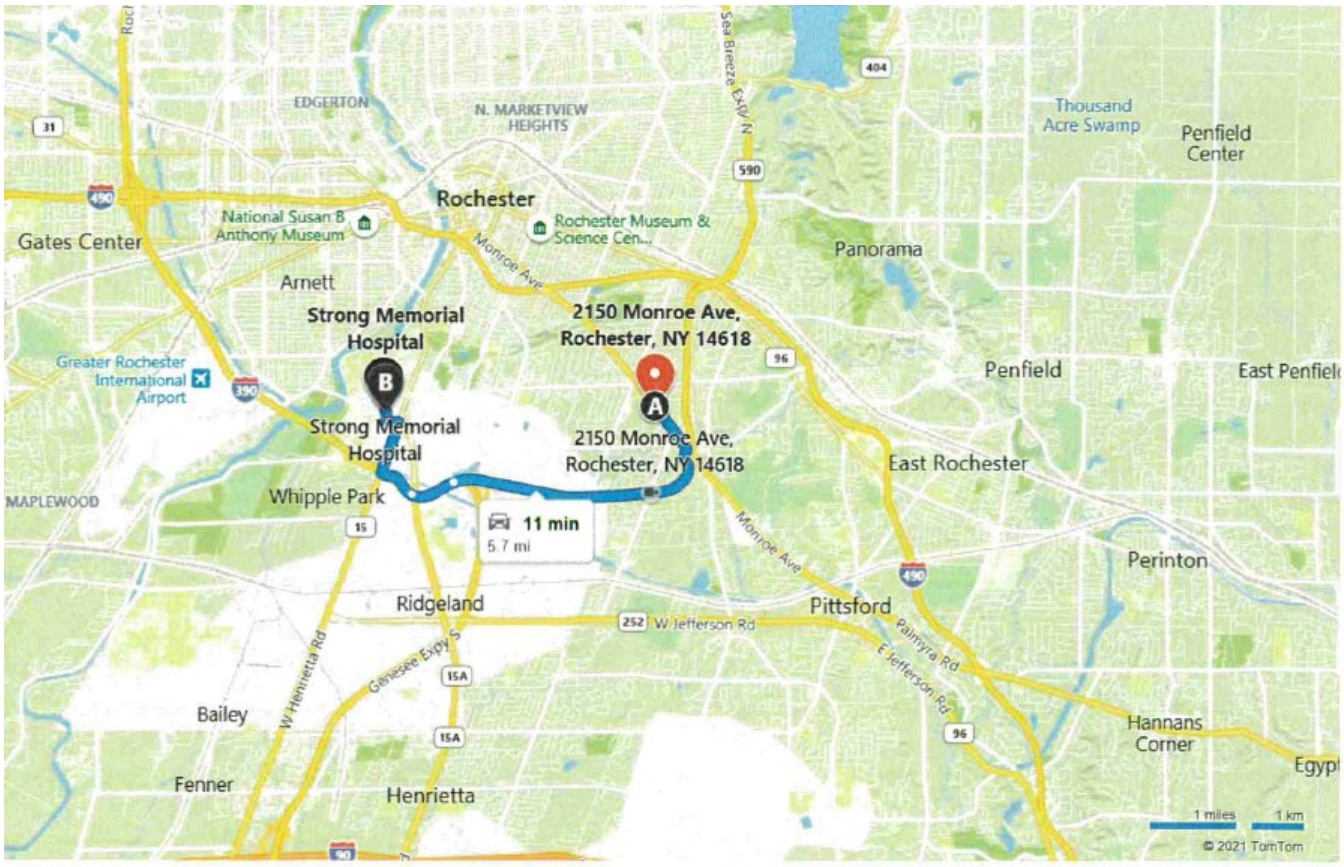
Facility Name: Strong Memorial Hospital

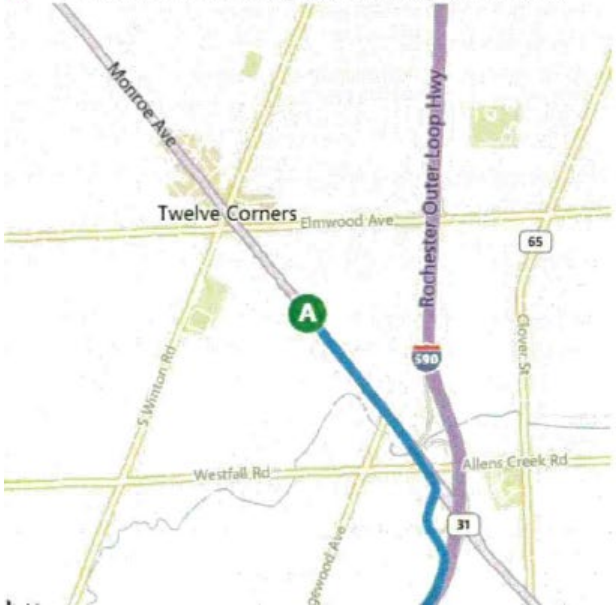
Address: 601 Elmwood Ave, Rochester, NY 14642

Telephone Number: 585-275-2100

DIRECTIONS TO PRIMARY HOSPITAL (see attached map):

• Head northwest on NY-31/Monroe Ave	0.3 mi.
• Bear left onto Elmwood Ave/County Hwy-87	2.5 mi.
• Keep left to get onto Elmwood Ave	0.6 mi.
• Turn left	108 ft.
• Turn right	350 ft.
• Arrive at Strong Memorial Hospital 601 Elmwood Ave.	


EDGERTON
N. MARKETVIEW HEIGHTS
Rochester
Gates Center
National Susan B Anthony Museum
Rochester Museum & Science Cen...
Monroe Ave
Arnett
Strong Memorial Hospital
2150 Monroe Ave, Rochester, NY 14618
Greater Rochester International Airport
Strong Memorial Hospital
2150 Monroe Ave, Rochester, NY 14618
Whipple Park
11 min
5.7 mi
MAPLEWOOD
Ridgeland
Bailey
Fenner
Henrietta
W Henrietta Rd
Genesee Expy S
W Jefferson Rd
Pittsford
Palmyra Rd
E Jefferson Rd
East Rochester
Panorama
Thousand Acre Swamp
Penfield Center
Penfield
East Penfield
Perinton
Hannans Corner
Egypt
Sea Breeze Expy N
1 miles
1 km
© 2021 TomTom


A
2150 Monroe Ave, Rochester, NY 14618
Monroe Ave
Twelve Corners
Elmwood Ave
Rochester Outer Loop Hwy
S Winton Rd
Westfall Rd
Allens Creek Rd
Glover St


B
Strong Memorial Hospital, 601 Elmwood...
Genesee River
S Plymouth Ave
Brooks Ave
STRONG
Mount Hope Cemetery
Mount Hope Ave
South Ave
Elmwood Ave
Strong Memorial Hospital
West Brighton
Kendrick Rd
University of Rochester
E River Rd
Westfall Rd

SECONDARY HOSPITAL (for immediate emergency treatment):

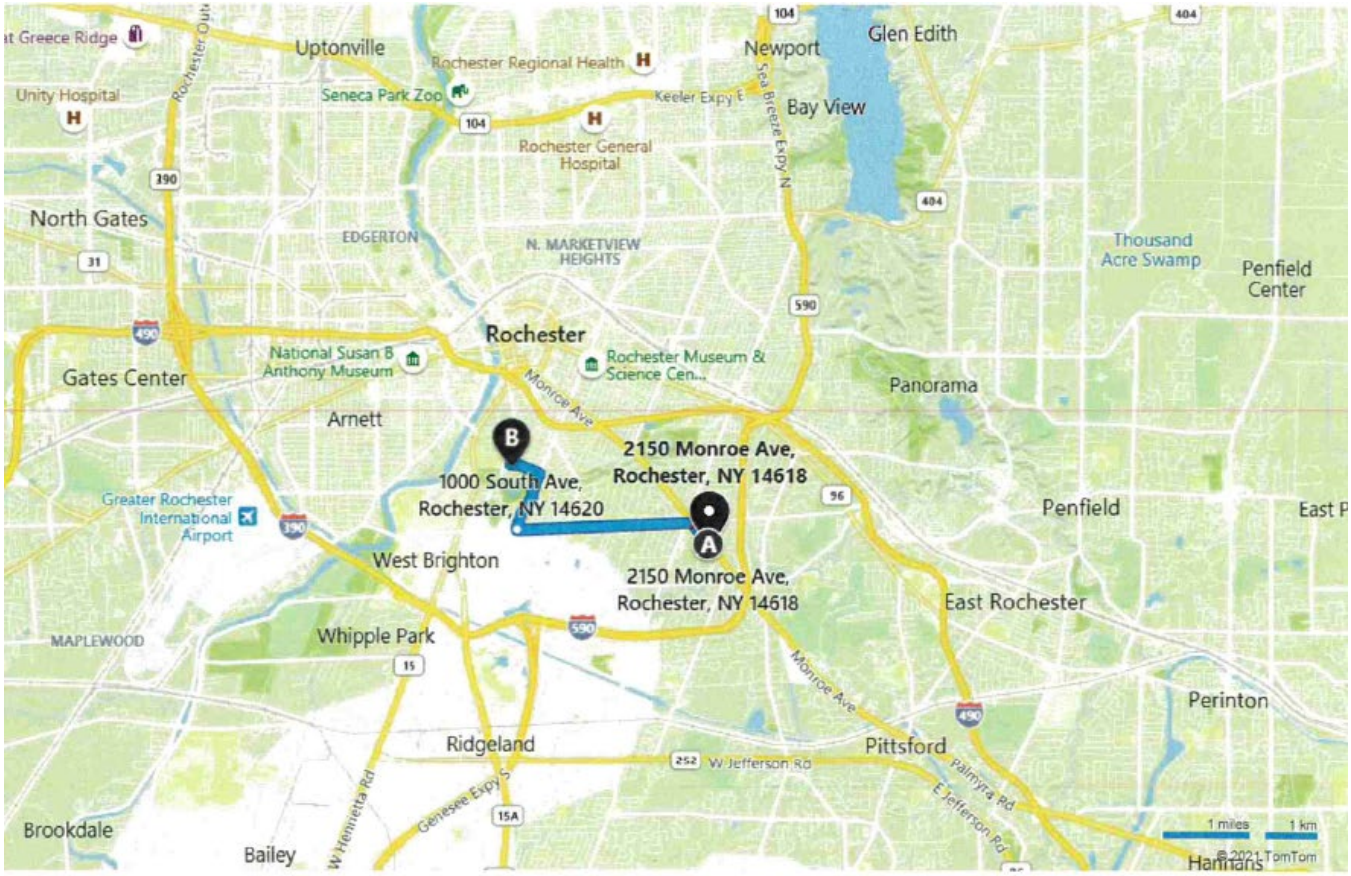
Facility Name: Highland Hospital

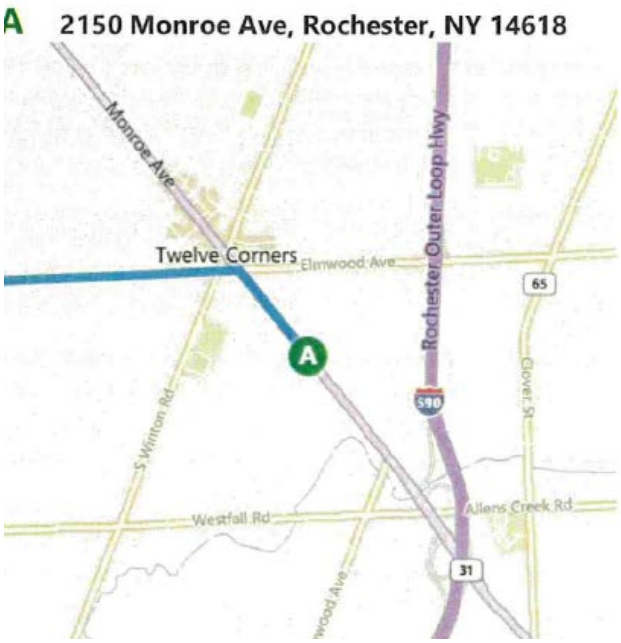
Address: 1000 South Ave, Rochester, NY 14620

Telephone Number: 585-473-2200

DIRECTIONS TO SECONDARY HOSPITAL (see attached map):

• Head northwest on NY-31/Monroe Ave	0.3 mi.
• Bear left onto Elmwood Ave/County Hwy-87	2.0 mi.
• Turn right onto Goodman Street	0.7 mi.
• Turn left onto Rockingham Street	0.3 mi.
• Turn left onto Mount Vernon Ave.	125 ft.
• Turn right	270 ft.
• Turn left	95 ft.
• Arrive at Highland Hospital 1000 South Ave	


Uptonville
Rochester Regional Health
Newport
Glen Edith
Unity Hospital
Seneca Park Zoo
Keeler Expy E
Bay View
Rochester General Hospital
North Gates
EDGERTON
N. MARKETVIEW HEIGHTS
Thousand Acre Swamp
Penfield Center
Rochester
Gates Center
National Susan B Anthony Museum
Rochester Museum & Science Cen...
Panorama
Arnett
B
1000 South Ave, Rochester, NY 14620
2150 Monroe Ave, Rochester, NY 14618
Greater Rochester International Airport
Penfield
West Brighton
A
2150 Monroe Ave, Rochester, NY 14618
East Rochester
MAPLEWOOD
Whipple Park
Perinton
Ridgeland
Pittsford
W Jefferson Rd
Brookdale
Bailey
Hamlans
1 miles
1 km
© 2021 TomTom


A
2150 Monroe Ave, Rochester, NY 14618
Monroe Ave
Twelve Corners
Elmwood Ave
Rochester Outer Loop Hwy
A
S Winton Rd
Clover St
Westfall Rd
Allens Creek Rd


B
1000 South Ave, Rochester, NY 14620
PEARL-MEIGS-MONROE
SOUTH WEDGE
Broadway
Ford St
Exchange Blvd
S Plymouth Ave
SWILLBURG
Mount Hope Ave
James Duffy School 12
B
STRONG
Mount Hope Cemetery
South Ave
Elmwood Ave
Jesuit

Wood HSSE Management System "Blue Book:"

The Wood HSSE management system is defined by the HSSE Management System Standard -the Blue Book. It consists of fifteen elements that set mandatory minimum standards for the management of HSSE across Wood. These minimum standards define how Wood leads, plans and organizes itself to ensure HSSE risks are controlled and to deliver continuous improvement in HSSE performance. The Blue Book is supported by Wood HSSE standards, procedures, guidelines and tools which provide further direction and advice on how to comply with the Blue Book's requirements.

Wood's core ***Vision*** is to:

Inspire with ingenuity, partner with agility, create new possibilities...

The Wood ***Values*** are:

- ***Care*** -Working safely, with integrity, respecting and valuing each other and our communities
- ***Commitment*** - Consistently delivering to all our stakeholders
- ***Courage*** - Pushing the boundaries to create smarter, more sustainable solutions

The Wood HSSE management system helps translate our Vision and Values into action by:

- Providing structure and consistency in the way we manage HSSE
- Focusing our attention on risk management, ensuring compliance and undertaking assurance activities
- Supporting the development of a positive HSSE culture which in turn supports the management system
- Providing a framework for continuous improvement

Refer to the Wood "Blue Book" for additional information (LINK).

Wood E&IS HSE Management System Manual and California IIPP):

The Wood E&IS Health, Safety, Security and Environment (HSSE) Management System Manual and California Injury and Illness Prevention Plan (IIPP) describes the HSSE system and tools developed & implemented at Wood E&IS. The manual addresses HSSE requirements for offices, laboratories and projects, including those of various duration, scale, location, and jurisdiction.

Wood E&IS's Safety philosophy as it pertains to all work conducted whether in the office, laboratory or in the field is:

- All incidents and injuries can be prevented.
- Management and staff are responsible for preventing injuries and occupational illnesses.
- Occupational safety and health are part of every employee's total job performance.
- Working safely is a condition of employment.
- All workplace hazards can be safeguarded.

- Training employees to work safely is essential and is the responsibility of management/supervision.
- Prevention of personal injuries and incidents and protection of environment is good business.

These principles tie into the Wood plc Health, Safety, Security and Environment (HSSE) Policy Statement:

Our HSSE Policy

At Wood, we care for our people and the environment. We ensure that our people have a safe, healthy and secure workplace; this is a fundamental right. This policy explains how we provide this.

We will:

- Care for our people.
- Identify and manage hazards to eliminate or mitigate resultant risks.
- Prevent injury, ill-health, pollution and loss resulting from our activities.
- Be responsible in our approach to protecting the environment and minimising our impacts.
- Deliver continual improvement in our health, safety, security and environmental performance.

Name Robin Watson
Position **Chief Executive**
Date **01 January 2019**

We do this by:

- Ensuring we have exemplary HSSE leadership and management.
- Having effective, efficient and applied HSSE management systems.
- Understanding and complying with all legal, industry and other external requirements.
- Establishing and attaining clear HSSE objectives.
- Learning lessons from our incidents and preventing reoccurrence.
- Engaging with our people on HSSE issues.
- Working with our customers, regulators and others to promote continuous improvement.
- Training our people to be competent and safe in undertaking their roles.
- Helping our supply chain and partners to meet our own policy obligations.
- Promoting a positive HSSE culture that drives HSSEA improvement.
- Encouraging anyone to stop a job if they perceive any HSSE shortfall.

We commit ourselves to this Policy.

We will review annually, or where significant changes impact our business.

Policy No: HSE-POL-100001
Revision: 2
Date: 01 January 2019

Content property of Wood. This document is uncontrolled once printed.
Check Wood Management System for the current version.

Wood Safety Shield:

A metaphor for protection - pulls together our HSSE processes and procedures to drive a simplistic and consistent message to our workforce around HSSE.

Aligned with our values, the three elements of the shield are:

- Prepare: It takes commitment to prepare.
- Engage: It takes care to engage.
- Intervene: It takes courage to intervene.

The Safety Shield seeks to educate, inform, monitor, improve and recognize our employees.

wood.
Safety Shield
Prepare. Engage. Intervene.

Six Safety Essentials:

The Six Safety Essentials are designed to support the safe execution of work in all our operating locations with the development of a "common set of behaviors" that we can all share. Wood, in our goal to be recognized as a world-class leader in HSSE safety must strive to ensure our daily overall consistency of HSE standards, leadership and performance.

When performing work at the site, the Wood **Six Safety Essentials** will be followed:

- Always Take Care
- Follow the Rules
- Do a Risk Assessment
- You Must Intervene
- Manage Any Change
- Wear the Correct PPE



Wood Nine Life Saving Rules:

The Life Saving Rules are Wood's minimum standard - it is an expectation that everyone must comply with the rules. Everyone needs to understand that:

- You must comply with the Life Saving Rules because non-compliance could result in serious injury or fatality to you or your colleagues
- If you breach a Life Saving Rule you may be subject to disciplinary action.

Supervisors and Managers must understand that:

- Breaking the Life Saving Rules will not be tolerated - no matter how urgent or important a task is.

- You have a duty to ensure that people undertaking a task have the right instruction, equipment and training to comply with the Life Saving Rules.



Bypassing Safety Controls

Confined Space

Driving

Energy Isolations

Hot Work

Line of Fire

Safe Mechanical Lifting

Work Authorization

Working at Height

Stand Up for Safety:

Wood's Stand up for Safety initiative focuses on four hazards that were identified by analyzing Wood's HSE incidents and High Potential events. These are four are areas of primary concern and are hazards that Wood employees face collectively as a global business. These four hazardous areas are:

- Dropped objects
- Driving
- Working at Height
- Process Safety

Extra attention will be paid to these four key areas if applicable when working on the project site.

HEART:

HEART is the corporate observation reporting system that all Wood employees are to use to report safety or environmental observations.

To enter a HEART observation, use the following link: https://cfapps.Woodfw.com/HEART/

HEART is also accessible from mobile devices. Click here for instructions on how to access HEART from a mobile device.

A manual HEART observation form can be accessed from here.

HEART

☐ Unsafe Act ☐ Unsafe Condition
☐ Safe Behaviour ☐ Safe Condition

☐ Wood ☐ Sub-contractor ☐ Client ☐ Third Party

Observer name		Observer email	
Observation date		Observation time	
Business Unit		Business Group	
Project/Office		Site/Office name	
Exact location of observation			
If Safe Behaviour state name of individual or team			

Details of safety observation

Immediate action taken/recommended

☐ Do you require feedback?

Form No: HSE-FOR-100705
Rev/Date: 0 17 January 2019

Category *Select one*

Work environment		**Integrity management**	
	Fire & fire protection		Accountability
	Furniture & work equipment		Management of change
	Housekeeping		Competence
	Lighting & noise		Emergency response
	Office security		Hazard evaluation & risk management
	Traffic routes & parking areas		Incident investigation & management
	Temperature & ventilation		Protective systems
Job factors		**Procedures & instructions**	
	Safety critical communications		Adequate / Inadequate
	Fatigue / Workload		Implemented / Not implemented
	Management of change		Followed / Not followed
	Training & competence		Understood / Not understood
Contractor site safety		**Travel & safety away from workplace**	
	Barrier / Segregation		Electricity
	Safety awareness & behaviour		Tools & equipment
	Procedure implementation		Falls & slips
	Safety induction & briefings		Fire safety
	Housekeeping		Manual handling
	Safety planning		Personal security
	Personal Protective Equipment (PPE)		Sport & leisure
	Signage & instructions		Transportation
Environment		**Tools & equipment**	
	Energy usage		Safe / Unsafe condition
	Waste & recycling		Correct / Incorrect use
	Water usage		Correct / Incorrect tool for the job

HEART conversation 5 step process

- Prepare
- Observe
- Initiate - Introduce yourself; Praise good behaviour; Listen; Ask open questions
- Agree and commit
- Record and close out

Typical questions

- How can you and your workmates get hurt?
- What type of accident may happen?
- How can you and others avoid getting hurt?
- What if something unexpected happens?
- What have you done to prevent you and your colleagues getting hurt?
- How and when was the pre-job safety discussion (toolbox talk) conducted?
- What are the job specifics/team composition changes that occurred since you started?
- How has the work environment changed since you started?
- How can this job be done more safely?

Tailgate Safety Meeting Form

Check One:

☐ Initial Kickoff Safety Meeting ☐ Regular/Daily Tailgate Safety Meeting ☐ Unscheduled Tailgate Safety Meeting

Date: _____ Site: _____

Site Manager: _____ Site Health and Safety Officer: _____
Print *Print*

Planned Activities: _____

Order of Business

Topics Discussed (Check all that apply)

- ☐ Scope of Work
- ☐ Site History/Site Layout
- ☐ Personnel Responsibilities
- ☐ Training Requirements
- ☐ Hazard Analysis of Work Tasks (chemical, physical, biological and energy health hazard effects)
- ☐ Applicable SOPs (e.g., Hearing Conservation Program, Safe Driving, etc.)
- ☐ Safe Work Practices
- ☐ Engineering Controls
- ☐ Chemical Hazards and Controls
- ☐ Signs and symptoms of over exposure to site chemicals
- ☐ Medical Surveillance Requirements
- ☐ Action Levels
- ☐ Monitoring Instruments and Personal Monitoring
- ☐ Perimeter Monitoring, Type and Frequency
- ☐ PPE Required/PPE Used
- ☐ Define PPE Levels, Donning, Doffing Procedures
- ☐ Decontamination Procedures for Personnel and Equipment
- ☐ Physical Hazards and Controls (e.g., overhead utility lines)
- ☐ Anticipated Weather (snow, high winds, rain)
- ☐ Temperature Extremes (heat or cold stress symptoms and controls)
- ☐ Biological Hazards and Controls (e.g., poison ivy, spiders)
- ☐ Site Control (visitor access, buddy system, work zones, security, communications)
- ☐ Sanitation and Illumination
- ☐ Logs, Reports, Recordkeeping
- ☐ Incident Reporting Procedures
- ☐ Near Misses/Hazard ID including worker suggestions to correct and work practices to avoid similar occurrences
- ☐ General Emergency Procedures (e.g., locations of air horns and what 1 or 2 blasts indicate)
- ☐ General Emergency Response Procedures (e.g., earthquake response, typhoon response, etc.)
- ☐ Medical Emergency Procedures (e.g., exposure control precautions, location of first aid kits, etc.)
- ☐ Route to Hospital and Medical Care Provider Visit Guidelines
- ☐ Site/Regional Emergency Response Procedures (e.g., exposure control precautions, location of first aid kits, etc.)
- ☐ Hazardous Materials Spill Procedures

PPE required for the tasks to be conducted: _____

Required Permits: _____

Site Access or other issues: _____

Tailgate Safety Meeting Form

Safety Suggestions by Site Workers: _____

Action Taken on Previous Suggestions: _____

Injuries/Incidents/Personnel Changes since last meeting: _____

Observations of unsafe work practices/conditions that have developed since previous meeting: _____

Location of (or changes in the locations of) evacuation routes/safe refuge areas: _____

Additional Comments: _____

Attendee signatures below indicate acknowledgment of the information and willingness to abide by the procedures discussed during this safety meeting

Name (Print)	Company	Signature

Meeting Conducted by: _____ Title: _____
Print

Signature: _____ Time: _____
Print

PPE Selection Guidelines

When selecting the appropriate PPE for the job, consider the following:

- **Safety glasses** – general eye protection – source of hazard, typically coming from straight on, required at most sites
- **Tinted Safety Glasses** – same as above, but when working in direct sunlight. May need two both tinted and untinted if working in both sunlight and shade/overcast skies.
- **Safety goggles** – needed for splash hazard, more severe eye exposures coming from all directions. Non-vented or indirect venting for chemical splash, non-vented for hazardous gases or very fine dust, vented for larger particulates coming from all directions.
- **Face shield** – needed to protect face from cuts, burns, chemicals (corrosives or chemicals with skin notation), etc.
- **Safety boots** – needed if danger of items being dropped on foot that could injure foot
- **Hard hat** – danger from items falling on head or bumping head against objects – any overhead work, tools, equipment, etc. that is above the head and could fall on head of item fails, or falls off work platform. Any work around low hanging equipment or structures. Typically required at most sites as a general PPE
- **Thin, chemical protective inner gloves** (e.g., thin Nitrile, PVC – do not use latex – many people are allergic to latex) –needed to protect hands from incidental contact with low risk contamination at very low concentrations (ppb or low ppm concentrations in groundwater or soil) or used in combination with outer gloves as a last defense against contamination. Need to specify type
- **Outer gloves** – thicker gloves (e.g., Nitrile, Butyl, Viton, etc.) – used when potential for high concentrations of contaminants (e.g., floating product, percent ranges of contaminant, opening drums, handling pure undiluted chemicals, etc.). Need to specify type.
- **Leather gloves, leather palm, cotton** – good in protecting hands against cuts – no protection from chemicals. May be used in combination with chemical protective gloves.
- **Boot Covers –** when there is contamination in surface soils or waking surface in general. When safety boots need protection from contact with contaminants.
- **White (uncoated) Tyveks** – protect clothing from getting dirty, good for protection against solid, non-volatile chemicals (e.g., asbestos, metals) – no chemical protection.
- **Polycoated Tyveks** – least protective of chemical protective clothing. Used when some risk of contamination getting on skin or clothing. Usually, lower ppm ranges of contaminants.
- **Saranex** – Greater protection against contamination than Polycoated Tyveks. Used to protect against PCBs or higher concentrations of contaminants in the soil or groundwater.
- **Other Chemical protective clothing** – if significant risk of dermal exposure, contact H&S to determine best kind.
- **Long sleeved shirts, long pants** – if working in areas with poison ivy/oak/sumac, poisonous insects, etc. and no chemicals exposure. May want to use uncoated Tyveks for work in areas where poisonous plants are known to be to protect clothing.
- **Cartridge Respirator (Level C PPE)** – Need to calculate change schedule (contact Division EH&S Manager for this) to determine length of use. To be able to use cartridge respirators, need to know contaminants, estimate levels to be encountered in the breathing zone, need to ensure that cartridge will be effective against COCs, and need to be able to monitor for COCs using PID, FID, Dräger tubes, etc.. If can't do any of these, then Level B PPE is probably going to be needed.
- **High Visibility Vest** – needed for any road work (within 15 feet of a road) or when working on a site with vehicular traffic or working around heavy equipment. Needed if work tasks would take employee concentration away from movement of vehicles and workers would have to rely on the other driver's ability to see the employee in order not to hit them. This includes heavy equipment as well as cars and trucks, on public roads or the jobsite. Not needed if wearing Polycoated Tyveks – as they are already high visibility.
- **Reflective Vest** – see above, but for use at night.
- **Hearing Protection** – needed if working at noise levels above 85 dBA on a time weighted average. If noise measurements are not available, use around noisy equipment, or in general, if you have to raise your voice to be heard when talking to someone standing two feet away.
- **Protective Chaps –** required when using a machete or chain saw or any other cut hazard to legs.

Incident Report Forms

AHA - Field Work Oversight
Activity Description

Activity/Work Task:	Field Work Oversight		
Project Location:	**Peter's Dry Cleaners**		
Contract Number:			
Date Prepared:	**2/15/21**	**Date Accepted:**	**2/15/21**
Prepared by (Name/Title):	Chuck Staples/ Ass. Scientist		
Reviewed by (Name/Title):	Kendra Bavor, CSP		

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures
-

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code): **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1a) N/A	▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Complete site specific/ client required training ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ First aid kits shall be available at the work site and on each transport vehicle. ▪ Familiarize yourself with route to the site ▪ Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions ▪ Verify that subsurface utilities have been identified.	**L**
2. Traveling to the site by vehicle	2a) See JHA for Mobilization, Demobilization and Site Preparation	▪ See JHA for Mobilization, Demobilization and Site Preparation	**L**
3. Initial arrival—assess site conditions	3a) Communication with subcontractor and other site personnel	▪ Develop communication methods (agree on hand signals, warning alarms) ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the whereabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone ▪ Hold and document Safety tailgate meetings ▪ Establish work zones, evacuation routes and rally locations.	**L**

	3b) Insect Bites and Stings	▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects. ▪ Inform crew members if allergic to insects and what to do if you need assistance. ▪ Avoid wearing heavy fragrances. ▪ Carry first-aid and sting relief kits. ▪ Carry identification of known allergies and necessary emergency medication. ▪ Spray clothing with insect repellant as a barrier. ▪ Wear light colored clothing that fits tightly at the wrists, ankles, and waist. ▪ Cover trouser legs with high socks or boots. ▪ Tuck in shirt tails.	**L**
	3c) Poisonous plants	▪ Wear long sleeves, long pants and boots ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with high visibility spray paint if working at a fixed location. ▪ Look for signs of poisonous plants and demark area to aid in avoiding plant. ▪ Do not touch any plant part to any part of your body/clothing. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.	**L**
	3d) Vermin, leaches, animal borne disease	▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Wear long sleeve shirt and full length pants ▪ Be aware of your surroundings. ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Do not put hand/arm into/under an area that you cannot see into/under clearly ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers.	**L**
	3e) Chemical Hazards	▪ Wear chemical resistant PPE as identified in the HASP ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Ensure that all containers are properly labeled	**L**

	3f) Overhead Power Lines	▪ Identify the location of all overhead power lines at the site. ▪ Maintain clearances depending on voltage - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV or less). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead power lines known to be 50 kV or less and 35 feet from all others.) ▪ Re-locate work so it is not close to power lines ▪ Avoid storing materials under overhead power lines	**L**
	3g) Underground Utilities	▪ All utilities will be marked prior to excavation activities ▪ For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet ▪ Use lineman's gloves when locating underground power lines ▪ Work at adequate offsets from utility locations ▪ Immediately cease work if unknown utility markings are discovered.	**L**
	3h) Cold Stress	▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration. ▪ Be aware of signs of hypothermia, its prevention, detection and treatment. ▪ Have extra protection available, in case of an emergency such as blankets and heating devices. ▪ Don't work under extremely adverse weather conditions ▪ Stay in tune to current weather and extended forecasts.	**L**

	3i) Heat Stress	▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.	**L**
	3j) Lightning and Thunder	▪ Monitor weather channels to determine if electrical storms are forecasted. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds.	**L**
	3k) Severe Weather	▪ Watch for clouds and incoming weather. ▪ Monitor weather forecasts. ▪ Train workers about weather and appropriate precautions. ▪ Identify a shelter and a safe place in event of tornado etc	**L**
	3l) Sun	▪ Keep body protected ▪ Wear sunscreen, wide brimmed hat or hardhat. ▪ Schedule work for cool part of day. ▪ Take breaks in the shade.	**L**
	3m) High Crime Areas	▪ Do not enter areas where threats are present. ▪ Contract security where applicable. Use the buddy system. ▪ Maintain contact with support such as radio or cell phone ▪ Do not work after dark.	**L**

	3n) Operations conducted at an active facility	▪ Stay well clear of operations being conducted at the facility ▪ Keep alert for moving materials, equipment or vehicles ▪ Determine client specific PPE needs prior to arriving at the site ▪ Determine client specific emergency response procedures and follow as appropriate ▪ Participate in client required safety training ▪ Get copies of Clients MSDSs for any client chemicals that workers may be exposed to. ▪ Provide MSDSs to client for all chemicals brought to the site.	**L**
	3o) Remote Locations	▪ Carry a two-way radio and know how to use it. ▪ Work in teams. Account for all at the end of the work day. ▪ Make sure someone on crew is certified in first aid. ▪ Carry a first aid kit.	**L**
	3p) Set up Decon Station	▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) ▪ Removal of PPE will be performed by the following tasks in the listed order: o Gross boot wash and rinse and removal o Outer glove removal o Suit removal o Respirator removal (if worn). o Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ Decon solutions will be disposed of according to the work plan.	**L**
4. Walk around the Site	4a) Poisonous plants	▪ See section 3C above	**L**
	4b) Vermin, leaches, animal borne disease	▪ See Section 3 D above	**L**
	4c) Chemical Hazards	▪ See Section 3 E above	**L**

	4d) Slips/Trips/Falls	▪ Wear slip resistant footwear preferably laced boots with a minimum 8" high upper and non-skid soles for ankle support and traction. ▪ Pay attention to where you place your feet ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Site SHSO will inspect the entire work area to identify and mark hazards. ▪ Clear area of trip hazards; mark or barricade those that cannot be moved; ▪ Use caution when walking around excavated areas ▪ Stay back at least 5 feet from excavated areas ▪ Use caution when walking on or around loose soil. ▪ Be aware of surroundings. Avoid muddy areas if possible.	**L**
5. Oversight during drilling, or construction operations	5a) Heavy Equipment/ Vehicles	▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the swing radius and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. Ground personnel will stay clear of all suspended loads. ▪ Ground personnel will wear high visibility vests ▪ Eye contact with operators will be made before approaching equipment.	**L**
	5b) Eye Injury	▪ Wear appropriate safety glasses (tinted for sun). ▪ Watch where you walk, especially around trees and brush with protruding limbs.	**L**
	5c) Foot Injury	▪ Wear steel toed boots ▪ Wear insulated steel toed boots during winter ▪ Ensure shoes/boots have good traction ▪ Pay attention to where you place your feet, especially when walking on uneven terrain	**L**

	5d) Head Injury	▪ Wear hardhat ▪ Do not walk or work under scaffolding or other elevated work unless there are guardrails and toeboards in place ▪ Flag or mark protruding objects at head level	**L**
	5e) Chemical Hazards	▪ See Section 3E above ▪ Wash hands and face prior to consumption of food, beverage or tobacco.	**L**
	5f) Dust - particulates (respiratory)	▪ Use dust suppression methods ▪ Stand upwind of point of dust generation	**L**
	5g) Overhead Power Lines	▪ See Section 3F above.	**L**
	5h) Underground Utilities	▪ See Section 3G above	**L**
	5i) Standing/Static Posture	▪ Change posture on a frequent basis ▪ Stretch prior to any physical activity	**L**
	5j) Slips/`Trips/Falls	▪ See Section 4D above	**L**
	5k) Noise	▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs). ▪ All equipment will be equipped with manufacturer's required mufflers. ▪ Hearing protection shall be worn by all personnel working in or near heavy equipment. ▪ Hearing protection will be worn when workers need to shout when standing two feet away from each other. ▪ Segregate noisy equipment from the operators ▪ Use sound dampening around noisy equipment	**L**
	5L) Moving Equipment	▪ Clear area of obstructions and communicate with all workers involved that drilling is beginning ▪ Do not exceed manufacturer's recommended speed, force, torque, or other specifications. and penetrate the ground slowly with hands on the controls for at least the first foot of soil to minimize chance of auger kick-out ▪ Stay clear of rotating auger ▪ Use long-handled shovel to clear away cuttings when auger has stopped ▪ Do not wear loose clothing ▪ Wear appropriate PPE including leather gloves and steel-toed boots (See HASP)	**L**

6. Sampling Oversight	6a) Chemical Hazards	▪ See Section 3E above ▪ Wash hands and face prior to consumption of food, beverage or tobacco. ▪ Calibrate meters in a clean, well ventilated area ▪ Store calibration gases in well vented area. Ensure chemical labels and warnings are legible.	**L**
	6b) Personnel Decontamination	▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) ▪ Removal of PPE will be performed by the following tasks in the listed order: o Gross boot wash and rinse and removal o Outer glove removal o Suit removal o Respirator removal (if worn). o Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ Decon solutions will be disposed of according to the work plan.	**L**
	6c) Lifting	▪ Good lifting techniques (lift with legs not back) ▪ Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials and drums. ▪ Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs) ▪ Split heavy loads in to smaller loads ▪ Make sure that path is clear prior to lift. ▪ Redesign work area to avoid low lifts ▪ Stretch prior to lifting ▪ Maintain a healthy life style and level of physical fitness.	**L**

	6d) Hand Tools	▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools. ▪ Daily inspections will be performed. ▪ Remove broken or damaged tools from service and tag out as defective ▪ No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) ▪ Do not use excessive force or impact ▪ Do not use tool improperly. Ensure all workers are trained	**L**
	6e) Slips/Trips/Falls	▪ See Section 4D above.	**L**

	6f) Struck by Vehicle	▪ Ground personnel in the vicinity of vehicles operations will be within the view of the operator at all times. ▪ Ground personnel will not stand directly behind vehicles when it is in operation ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads. ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary ▪ Place cones in the font and rear of the vehicle ▪ Prior to driving off, walk around vehicle to collect cones and identify any hazards - especially low level hazards that may be difficult to see when in the vehicle. ▪ Set up "Workers in the Road" or similar warning signs and cones to alert traffic. ▪ Use emergency flashers and roof top flashing light (recommended) to alert oncoming vehicular traffic. ▪ Remain alert at all times as to the traffic outside the vehicle. Step to the side of the road when distracted by by-standers. Keep unofficial personnel out of the work area. ▪ Exit vehicle with caution. ▪ Wear High Visibility Vest when outside the vehicle. Utilize vehicle as a shield from oncoming traffic, as practical	**L**
7. IDW pickup oversight	7a) Foot Injury	▪ See Section 5C above.	**L**
	7b) Chemical Hazards	▪ See Section 3E above.	**L**
	7c) Lifting	▪ See Section 6C above.	**L**
	7d) Slips/Trips/Falls	▪ See Section 4D above	**L**
8. Return to office/home	8a)See Mobilization/ Demobilization and Site Preparation JHA	**See Mobilization/ Demobilization and Site Preparation JHA**	**L**

AHA - Field Work Oversight
Activity Description

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (1/2 face respirator with P-100 cartridge, Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA - Vehicle Travel – Journey Management Plan

Activity/Work Task:	Vehicle Travel – Journey Management Plan		
Project Location:	Franklin Cleaners; Hempstead, and Rockville Centre, NY		
Contract Number:	D009809-14		
Date Prepared:	11/3/20	**Date Accepted:**	1/19/2021
Prepared by (Name/Title):	Bradley LaForest/Project Manager		
Reviewed by (Name/Title):	Katie Amann/Assistant Project Manager		

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures for driving a car or truck to or from the site.

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the project HASP or client information for additional requirements, and emergency procedures.
Workers to follow general site safety controls for Hazard Signage/PPE, Housekeeping, Slips Trips and Falls, Biological hazards, Mobile equipment, Confined spaces, Fall hazards, Electrical, and any active operating equipment or construction activities.

Overall Risk Assessment Code (RAC-Residual) Use highest code: **H**

Risk Assessment Code (RAC) Matrix

Severity \ Probability	Almost certain	Likely	Possible	Unlikely	Rare
Catastrophic	E	E	E	H	M
Major	E	H	H	M	L
Serious	H	H	M	L	VL
Minor	M	M	L	L	VL
Negligible	L	VL	VL	VL	VL

Step 1: Review each **"Hazard"** to identify Probability and Severity (Refer to Risk Register)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Almost certain, Likely, Possible, Unlikely, Rare.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Major, Serious, Minor or Negligible

Step 2: Identify the RAC-Inherent as E, H, M, L or VL for each "Hazard" on AHA, **before controls are applied.**

Step 3: Identify the RAC-Residual as E, H, M, L or VL for each "Hazard" on AHA, **after controls are applied.**

Step 4: Annotate the overall highest RAC-Residual at the top of AHA.

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk
VL = Very Low Risk



MANAGEMENT OF CHANGE: If there is a change or deviation from the planned activity, you must stop the job and re-evaluate the risk assessment and the precautions taken. Any changes to work described in this AHA shall require review by a Qualified Person.

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Safe Vehicle	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** Current Driver's license	Daily inspection of equipment per manufacturer's instructions.

AHA - Vehicle Travel – Journey Management Plan

Job Steps	Hazards	RAC Inherent	Controls	RAC Residual
1. Prepare for travel	Distractions - loss of focus	VL	▪ Ensure you have all materials with you necessary to conduct work effort. ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current. ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment). ▪ Determine if trip is considered Non-Routine: o Driving on business makes up <50% of the driver's daily job; o The route is variable and not part of the driver's daily or weekly drive plan; o Trips during darkness in excess of 20 miles (32 km); o Environmental or visibility hazards require a reduction in vehicle operating speed; o The terrain could reasonably be anticipated to impact the shifting of loads and/or require the use of 4-wheel drive; and o Security concerns warrant higher level of caution. ▪ If non-routine, complete a Journey Management Plan ▪ Plan route. Adjust based on driving conditions. Consider: o Communications o Other Wood E&IS vehicles on same route ("convoy") o Emergency plans o Meeting point(s) o Fuel / food / rest points o Review rules and procedures (driving, remote work, lone worker) o Other ▪ If renting vehicle, select best vehicle type for road and travel conditions (e.g., AWD or 4WD if snow/ice, larger vehicle if wildlife encouners are a possibility, etc. ▪ Evaluate weather conditions prior to starting trip. Postpone trip if possible, If travel during bad weather required, adjust route to avoid backroads as much as possible. ▪ Ensure that a copy of the current insurance certificates and incident reporting procedures/forms are available during travel. ▪ If long trip, notify others of your estimated arrival time so they can follow up if you don't arrive on time.	VL

	Driver Fatigue	H	▪ Get pleanty of rest prior to starting trip.
			▪ Consider Wood policy on driving and work (duty) hours limitations when planning trip:
			  ○ Maximum driving time between breaks – 4.5 hours followed by 30 minute break
			  ○ Maximum duty hours within a rolling 24-hour period – 14 duty hours
			  ○ Maximum driving hours within a single rolling 24-hour period – 10 hours total, excluding communting time (11 hours including commuting time)
			  ○ Off duty period in a rolling 7-day period - Minimum of a continuous 24 hour break
			▪ Comply with the Jurisdictional P&O Work-Week Schedule Procedures and do not exceed the legislated maximum hours of work, rest periods, and/or Agency Approvals for excess hours of work for the specific activity/project.
			▪ Comply with the E&IS HSE Fatigue Management Procedures (CAN: HSE-PRO-100387, US Fatigue Management Procedure HSE-PRO-100xxx).
			▪ Consider alternatives (e.g., other modes of transportation such as by air, staying over at site location an extra day, breaking up trip by staying at hotel at halfway point, etc.).
			▪ Avoid driving after dark.
				M

	Vehicle defects	L	Inspect vehicle for defects such as: ▪ Inadequate fluids (e.g., fuel, antifreeze, oil, windshield washer) ▪ Worn/flat tires ▪ Windshield wipers loose, worn, or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working ▪ Exterior or interior damage (e.g., scratches, dents)	L
	Insufficient emergency equipment, unsecured loads	M	▪ Ensure vehicle has first aid kit and that all contents are current (if first aid kits are not provided at the site). ▪ Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work. ▪ Cell phones are recommended to call for help in the event of an emergency. ▪ Vehicles carrying tools must have a safety cage in place; all tools must be properly secured. ▪ Valuables shall be removed from the vehicle overnight if possible. ▪ Ensure parking cones are present, if applicable.	L

2. Operating vehicles	Collisions, unsafe driving conditions	H	▪ Drive defensively! ▪ Each operator shall observe all traffic laws, including established speed limits. ▪ Do not use cruise control during inclement (wet/icy) road conditions. ▪ Do not eat or use tobacco products (e.g. smoking or e-cigarettes) in the vehicle. ▪ Avoid any distracting or potentially distracting activities while operating a vehicle, including but not limited to: the use of any device that requires the use of headphones; reaching for items under the seat, in the back seat or in the glove box. ▪ Pets are prohibited to ride in a company vehicle. ▪ Non-E&IS employees are prohibited from operating Company vehicles. ▪ Non-E&IS employees are prohibited from riding in E&IS vehicles unless their presence is required for the conduct of business for E&IS or its client; nonwork riders (e.g., hitch hikers, girl friend, mother-in-law) allowed in vehicles, unless authorized on a case-by-case basis. ▪ Seat belts must be used at all times by all occupants when the vehicle is in gear. ▪ Drive at safe speed for road conditions. ▪ Maintain adequate following distance. ▪ Pull over and stop if you have to look at a map or use a cell phone. ▪ Cellular telephones are prohibited from use by the operator while driving or even when stopped at stop lights, including texting, emailing, and including the use of BlueTooth devices or car microphone/speakers. ▪ Mount global positioning satellite (GPS) navigating devices within the vehicle as to not obstruct the driver's view of the roadway and attached so that it will not injure any of the vehicle's occupants in the event of a sudden stop. Window mounting of navigation devices is prohibited. ▪ The use of GPS-enabled smartphones is allowed as long as the device is mounted, directions setup prior to driving, has an audio feature, is not adjusted while driving. ▪ Try to park so that you don't have to back up to leave. ▪ If backing is required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary.	M
	Intersections	H	▪ Proceed carefully through intersections. ▪ Ensure that cross traffic has stopped before proceeding, especially if the light has just turned green. Look out for drivers running red lights! ▪ When merging into traffic or turning, ensure vehicles in front have merged/turned (and not stopped) prior to proceeding.	M

	Dusty, winding, narrow roads	H	▪ Go slow around corners, occasionally clearing the windshield.	M
	Rocky or one-lane roads	H	▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.	M
	Stormy weather	H	▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms.	M
	When angry or irritated	H	▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	M
	Turning around on narrow roads	H	▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a spotter if available.	M
	Sick or medicated	H	▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.	L
	On wet or slick roads	H	▪ Drive slow and safe.	M
	Animals on road	H	▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas	H
	Vehicle accident	H	▪ Employees should follow Wood E&IS vehicle operation policy and be aware of all stationary and mobile vehicles.	H
3. Parking	Striking other vehicles, objects	H	▪ Choose parking spot that is away from other vehicles, if possible. ▪ Choose a spot that will allow the driver to drive forward when leaving the site. ▪ Back into parking spots, or pull through when parking in perpendicular parking spaces (drive forward into angle/herring bone type parking spots). ▪ The vehicle gear must be placed in park and parking brakes engaged, when required. ▪ When two or more occupants are in a Company vehicle, one occupant will act as a spotter and safely stand outside the vehicle, to guide the vehicle into and out of a parking spot to ensure it does not hit another vehicle, pedestrian, barrier or any other object.	M
4. Leaving parking spaces	Striking other vehicles, objects	H	▪ Walk around the vehicle before leaving and identify hazards (low-lying objects, location of other vehicles or pedestrians, other vehicles with drivers that may be leaving at the same time, etc. ▪ If backing is unavoidable, use a spotter if a second person is available; if no spotter available, back slowly, checking for other vehicles, pedestrians, etc. ▪ Keep alert!	M
5. Driving back from the job site	See hazards listed for “Operating vehicles” Key Work Step	H	▪ See safe work practices for “Operating vehicles” Key Work Step	M
6. Parking at office	Striking other vehicles, objects	H	▪ See safe work practices for “Striking other vehicles, objects” Hazard/Potential Hazard for “Parking at job site” Key Work Step.	M

7. End travel	Vehicle defects	H	▪ Inspect vehicle. ▪ Repair or initiate repair of all vehicle deficiencies that occurred due to the trip.	M

AHA - Vehicle Travel – Journey Management Plan

FIELD ACKNOWLEDGEMENT OF PERSON(S) CARRYING OUT WORK

NAME(S):	SIGNED:	DATE:

SITE SUPERVISOR:	SIGNED:	DATE:

Note: For tasks/activities that extend beyond a single day, use attached DAILY RENEWAL form or FLRA.

AHA DAILY RENEWAL		
Date:	Weather:	
Changes noted:		
Site Supervisor (Print & Sign):		
Name(s):		
Date:	Weather:	
Changes noted:		
Site Supervisor (Print & Sign):		
Name(s):		
Date:	Weather:	
Changes noted:		
Site Supervisor (Print & Sign):		
Name(s):		

Activity/Work Task:	Mobilization/Demobilization and Site Preparation		
Project Location:	Franklin Cleaners; Hempstead, and Rockville Centre, NY		
Contract Number:	D009809-14		
Date Prepared:	11/3/20	**Date Accepted:**	1/192021
Prepared by (Name/Title):	Bradley LaForest, Project Manager		
Reviewed by (Name/Title):	Katie Amann, Assistant Project Manager		

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site-specific measures for mobilization and demobilization to/from the general site area and specific sampling locations

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Prepare for Site Visit	1a) N/A	Prior to leaving for site: ▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel-toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Complete site-specific/client-required training, if applicable ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions. ▪ Familiarize yourself with route to the site	L
	1b) Vehicle defects	Inspect company owned/leased vehicle for defects such as: ▪ Flat tires ▪ Windshield wipers worn or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working	L

Job Steps	Hazards	Controls	RAC
	1c) Insufficient emergency equipment, unsecured loads	Insufficient emergency equipment, unsecured loads: ▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) ▪ Ensure vehicle is equpped with warning flashers and/or flares and that the warning flashers work ▪ Cell phones are recommended to call for help in the event of an emergency ▪ Vehicles carrying tools must have a safety cage in place. All tools must be properly secured. ▪ Vehicles must be equipped with chocks if the vehicle is to be left running, unattended ▪ Ensure sufficient gasoline is in the tank	**M**
2. Operating vehicles	2a) Collisions, unsafe driving conditions	Drive Defensively!: ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low-level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary.	**M**
3. Driving to the jobsite (mobilization)	3a) Dusty, winding, narrow roads	Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.	**M**
	3b) Rocky or one-lane roads	Rocky or one-lane roads: ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.	**M**
	3c) Stormy weather, near confused tourists	Stormy weather, near confused tourists: ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.	**M**
	3d) When angry or irritated	When angry or irritated: ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	**L**
	3e) Turning around on narrow roads	Turning around on narrow roads: ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.	**M**
	3f) Sick or medicated	Sick or medicated: ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.	**M**

Job Steps	Hazards	Controls	RAC
	3g) On wet or slimy roads	On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.	M
	3h) Animals on road	Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas.	M
4. Gain permission to enter site	4a) Hostile landowner, livestock, pets	Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic. ▪ Ensure all animals have been secured away from work area.	M
5. Mobilization/ Demobilization of Equipment and Supplies	5a) Struck by Heavy Equipment/Vehicles	Struck by heavy equipment: ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.	M
	5b) Struck by Equipment/Supplies	Struck by Equipment/Supplies: ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.	M
	5c) Overexertion Unloading/Loading Supplies	Overexertion Unloading/Loading Supplies: ▪ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. ▪ Tightly secure all loads to the truck bed to avoid load shifting while in transit.	M
	5d) Overexertion Unloading/Loading Supplies	Caught in/on/between: ▪ Do not place yourself between two vehicles or between a vehicle and a fixed object.	M
	5e) Slip/Trip/Fall	Slip/Trip/Fall: ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ▪ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ▪ Drivers will check surface before stepping, not jumping down.	M
	5f) Vehicle accident	Vehicle accident: ▪ Employees should follow Wood vehicle operation policy and be aware of all stationary and mobile vehicles.	M
6. Site Preparation	6a) Slip/Trip/Fall	Slip/Trip/Fall:	M

Job Steps	Hazards	Controls	RAC
		▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas.	
7. Driving back from the jobsite	7c) See hazards listed under item #3	**See safe work practices under item #3**	**M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves, steel toe work boots, high visibility safety vest)	**Competent / Qualified Personnel:** All Wood project field staff **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

Activity/Work Task:	Field Work General		
Project Location:	Franklin Cleaners; Hempstead, and Rockville Centre, NY		
Contract Number:	D009809-14		
Date Prepared:	11/3/20	**Date Accepted:**	1/19/2021
Prepared by (Name/Title):	Bradley LaForest, Project Manager		
Reviewed by (Name/Title):	Katie Amann, Assistant Project Manager		

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site-specific measures for field work in general

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code): **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Mobilization/ See Mobilization/Demobilization and Site Preparation AHA Demobilization and Site Preparation	1A) See Mobilization/Demobilization and Site Preparation AHA	See Mobilization/Demobilization and Site Preparation AHA	**Exempt**
2. Communication	2A) Safety, crew unity	Talk to each other. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazard trees (trees that are rotten, dead, damaged, etc.). ▪ Always know the wherabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone. ▪ Review Emergency Evacuation Procedures (see below).	**L**
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	Always watch your footing. ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.	**L**
	3B) Falling objects	Protect head agains falling objects.	**L**

Job Steps	Hazards	Controls	RAC
		▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds.	
	3C) Damage to eyes	Protect eyes: ▪ Watch where you walk, ecpecially around trees and brush with limbs sticking out. ▪ Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. ▪ Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use ones with tinted lenses.	L
	3D) Bee and wasp stings	See AHA for Insect Stings and Bites	L
	3E) Ticks and infected mosquitos	See AHA for Insect Stings and Bites	L
	3A) Lifting Injuries (e.g., Back Injuries)	Lifting Injuries (e.g., Back Injuries) ▪ Site personnel will be instructed on proper lifting techniques. ▪ Perform warm-up excercises before starting work. ▪ **DO NOT EXCEED THE WOOD LIFTING LIMIT OF 50 POUNDS.** ▪ Use two people to lift, lower, or carry equipment or materials heavier than 50 pounds. ▪ Mechanical devices should be used to reduce manual handling of materials. ▪ Drive the field vehicle as close to the point that the heavy equipment/material will be used as long as the area is safe to drive into and you do not create hazards to you, your co-worker, or the vehicle.	L
	3F) Slips/Trips/Falls	Slips/Trips/Falls ▪ Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. ▪ Site SHSO inspect the entire work area to identify and mark hazards. ▪ Be aware of work area conditions that can cause slip hazards such as ponding of water on concrete surfaces. Ponding of water on smooth surfaces, such as concrete, coupled with the warm or freezing weather conditions has the potential to cause slippery condiitons such as growth of scum or ice, as applicable. Adding a layer of clean fill to the surface may prevent the growth of scum, and/or create a non-slippery walking surface.	L
	3G) Vehicular Traffic	Vehicular Traffic ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.	L
	3H) Dropped Objects	Dropped Objects ▪ Steel toe boots meeting ANSI Standard Z41 will be worn.	L
	3I) Noise	Noise ▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment	L

Job Steps	Hazards	Controls	RAC
		will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.	
	3J) Eye Injuries	Eye Injuries ▪ Safety glasses meeting ANSI Standard Z87 will be worn.	L
	3K) Struck/cut by tools	Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Guards will be kept in place while using hand and power tools.	L
	3L) Caught in/on/between	Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.	L
	3M) Contact with Electricity/Lightning	Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All utilities will be marked prior to excavation activities. ▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) ▪ The SHSO shall halt outdoor site operations whenever lightning is visible; outdoor work will not resume until 30 minutes after the last sighting of lightning.	L
	3N) Equipment failure	Equipment failure ▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.	L
	3O) Hand & power tool usage, cuts, burns, etc.	Hand & power tool usage ▪ Inspect the tool daily. ▪ Remove broken or damaged tools from service. ▪ Use the tool for its intended purpose. ▪ Use in accordance with manufacturers instructions.	L
4. Environmental health considerations	4A) Heat Stress	Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load.	L

Job Steps	Hazards	Controls	RAC
		▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.	
	4B) Heat Stress Index	Monitor heat index ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index).	**L**
	4C) Cold Extremes	Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.	**L**
	4D) Wind	Effects of the wind ▪ Wind chill greatly affects heat loss (see attached Wind Chill Index). ▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.	**L**

Job Steps	Hazards	Controls	RAC
	4E) Thunderstorms	Thunderstorms ▪ Monitor weather channels to determine if electrical storms are forcasted. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. ▪ Only return to work 30 minutes after the after the last strike or sound of thunder.	L
5. Check and calibrate industrial hygiene and other field instruments and equipment as required and as recommended by the manufacturer	5A) Exposure to Calibration Gases/Chemicals due to: • Use of damaged instruments.	Verify proper operation of the instrument prior to calibration. Calibrate instruments in an area with adequate ventilation and follow the manufacturer's recommendations. ▪ Wear appropriate PPE to conduct calibrations as specified in the instrument manual.	L
	5B) Exposure to Site contaminants due to: • Improper instrument calibration; • Misinterpretation of calibration results; • Improper instrument repair; • Improper use of instrument due to lack of training.	5A) Calibrate the instrument in accordance with the manufacturer's recommendations (see instrument manual) using the applicable calibration standard and calibration procedure. ▪ Perform calibrations at a frequency recommended by the manufacturer. Be aware of the instrument's limitations (e.g., detection limit, maximum sensitivity) and the conditions (e.g., humidity) that may affect correct operation or accuracy of that equipment. Possible sources of error that may affect the correct calibration of the instrument. ▪ Use only calibration materials recommended by the manufacturer for calibration. Do not use substitutions. ▪ Confirm that the connections between the instrument and the calibration gas/material is leak-free. ▪ Record all instrument calibrations in the field logbook. Include the instrument ID (type/manufacture/serial number/lamp eV, etc.), calibration gas used (chemical and concentration), and instrument result. ▪ Do not attempt to repair instrument. Return to the vendor for replacement. Report any damaged or malfunctioning instrument to the vendor. ▪ All personnel must be familiar with operation of the instrument and understand: - Theroy of its operation including any alarms and their setpoints - Materials the instrument can and cannot detect, - Instrument's limitations - The expected responses to calibration gases/materials - Interfering gases/chemicals and their affects on the instrument readings - When re-zeroing is appropriate.	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves (per HASP), steel toe work boots, high visibility safety vest)	**Competent / Qualified Personnel:** All Wood Employees on site **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Wind Chill Chart

Wind (mph)	Temperature (°F)																	
	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times — 30 minutes — 10 minutes — 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Activity/Work Task:	Decontamination		
Project Location:	Franklin Cleaners; Hempstead, and Rockville Centre, NY		
Contract Number:	D009809-14		
Date Prepared:	11/3/20	**Date Accepted:**	1/19/2021
Prepared by (Name/Title):	Bradley LaForest/Project Manager		
Reviewed by (Name/Title):	Katie Amann, Assistant Project Manager		

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures for decontamination

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Establish Decontamination Station	1A) Materials Handling	1A) Materials Handling ▪ Use proper lifting techniques. ▪ Use mechanical aids, if available, to move heavy items.	L
2. Decontamination / Steam cleaning	2A) Struck by steam/hot water/pressure washing	2A) Struck by steam/hot water ▪ Workers not directly engaged in steam cleaning operations must stay clear. ▪ Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. ▪ Use face shield **and** safety glasses or goggles, if steam cleaning. ▪ Stay out of the splash/steam radius. ▪ Pressure washer must have dead man switch. ▪ Do not direct steam at anyone. ▪ Do not hold objects with your feet or hands. ▪ Ensure that direction of spray minimizes spread of contaminants of concern. ▪ Use shielding as necessary.	M
	2B) Exposure to contaminants	2B) Exposure to contaminants ▪ Conduct air monitoring (see HASP). ▪ Wear proper PPE (see HASP). ▪ See SDSs for hazards associated with the decon solutions used (if other than water alone us used).	L
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls	L

Job Steps	Hazards	Controls	RAC
		▪ Be cautious as ground/plastic can become slippery. ▪ Use boots or boot covers with good traction.	
3. Vehicle Decontamination	3A) Vehicle traffic in and out of the Contamination Reduction Zone (CRZ)	3A) Large Vehicle Traffic ▪ Always wear a hard hat, steel toe boots, and a high visibility vest (unless Tyveks are used and are high visibility). ▪ Vehicle drivers are not to exit the vehicle in the CRZ. ▪ Identify an individual to communicate with vehicle drivers and maintain order. ▪ Trucks will be lined with plastic and kept out of direct contact with any contaminated materials during loading. Wear PPE when removing plastic lining from truck beds. ▪ If not in the vehicle, obtain eye contact with the driver so they are aware of your presence and location in the CRZ. ▪ If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.	**L**
	3B) Exposure to contaminants	3B) Exposure to contaminants ▪ Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used), hard hats, steel toe boots, and gloves while cleaning contaminated materials. ▪ Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. ▪ Conduct air monitoring (see HASP). ▪ See SDSs for hazards associated with the decon solutions (if other than water alone is used).	**L**
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery. ▪ Use boots or boot covers with good traction.	**L**
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure ▪ Wear PPE as outlined in the HASP. ▪ Refer to SDS for specific hazards associated with decon solutions. ▪ Monitor breathing zone for contaminants. ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP).	**M**
	4B) Materials Handling related injuries	4B) Materials Handling related injuries ▪ Use proper lifting techniques when lifting heavy equipment. ▪ Use two-person lift for heavy coolers.	**L**
5. Personal Decontamination	4C) Exposure to contaminants	4C) Exposure to contaminants ▪ Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the Exclusion Zone. ▪ Removal of PPE will be performed by the following tasks in the listed order: ▪ Gross boot wash and rinse and removal	**M**

Job Steps	Hazards	Controls	RAC
		▪ Outer glove removal ▪ Suit removal ▪ Respirator removal (if worn) ▪ Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ See SDSs for hazards associated with the decontamination solutions used. ▪ Decon solutions will be disposed of according to the work plan or related document.	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves (HASP), steel toe work boots, high visibility safety vest, hearing protection when needed.)	**Competent / Qualified Personnel:** All Wood field staff with hazardous materials training **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use

AHA – Hostile Public Interactions

Activity/Work Task:	Hostile Public Interactions		
Project Location:	Franklin Cleaners; Hempstead, and Rockville Centre, NY		
Contract Number:	D009809-14		
Date Prepared:	11/3/20	**Date Accepted:**	1/192021
Prepared by (Name/Title):	Bradley LaForest/ Project Manager		
Reviewed by (Name/Title):	Katie Amann, Assistant Project Manager		

Overall Risk Assessment Code (RAC) (Use highest code)	**H**

Risk Assessment Code (RAC) Matrix

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

This AHA involves the following:

- Establishing specific measures for managing risks in hostile or confrontational situations.
- Personnel should consider each property to be a separate site with varying risks specific to that location.

This AHA is not an exhaustive summary of all hazards associated with a Site. Refer to the site HASP for additional requirements. Hostile or confrontational situations may be very fluid and unpredictable – use good judgement and avoid putting oneself or crews at unnecessary risk.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

AHA – Hostile Public Interactions

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: (safety glasses, nitrile gloves, steel toe work boots) as required by HASP Note: The following PPE is recommended when interacting with the public • Branded reflective vest • Other Branded Items, e.g. hat	**Competent / Qualified Personnel:** All Wood employees **Training requirements:** Site Specific HASP Orientation Tailgate Safety Meetings	Field Level Risk Assessments – Document any and all perceived risks for each property separately.

AHA – Hostile Public Interactions

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	N/A	▪ Be aware of radical or strong political groups operating in the area. Familiarize yourself with any controversial issues or illegal activities in the area you will be working. ▪ Be able to briefly explain the necessity for the data collection you are charged with. ▪ Formulate a plan for dealing with hostile people that includes avoidance or calm, deliberate departure from their presence. ▪ Check internal project team tracking of known locations with hostile or aggressive residents or animals; consult with field lead for guidance as needed. Ensure client is aware of potentially dangerous situations. The Supervisor must make a decision if it is necessary to conduct the site visit. ▪ Program emergency numbers (auto-dial) on the cell phone. ▪ Use the buddy system when visiting private property, unless the location and resident are known to be friendly from previous interactions; however, be observant and manage any changes in conditions. ▪ See Mobilization/Demobilization for general preparation.	**L**
2. Driving into a potentially hostile situation	Potential physical harm to you/individual, vehicles, equipment	▪ Be alert. Watch for threatening behavior. ▪ Stay in the vehicle with doors locked. ▪ If the situation is suspicious and/or not safe, leave the scene at once. ▪ Report any threatening behavior to your supervisor and/or the local authorities depending on the severity of the situation.	**L**
3. Walking into a potentially hostile situation	Potential physical harm to you/individual	▪ Be alert. Watch for threatening behavior. ▪ Be courteous and respectful. ▪ Do not argue or threaten potentially hostile people. If you are at all uncomfortable, turn around and leave the scene in a calm, deliberate manner. ▪ Contact field manager, your supervisor, and/or the local authorities and report any threatening behavior.	**M**
4. Having a potentially hostile situation develop at working location	Potential physical harm to you/individual, vehicles, equipment	▪ Be aware of the changing environment. ▪ Be prepared to leave on short notice. ▪ Do not aggravate the situation by arguing or confronting individuals. ▪ If you become uncomfortable with the situation, leave the scene immediately; abandon your equipment if necessary. ▪ Contact field manager, your supervisor, and/or the local authorities and report the incident.	**M**

AHA – Hostile Public Interactions

5. Being approached by a hostile person(s)	Potential physical harm to you/individual, vehicles, equipment	▪ Leave the site if individual is behaving and/or verbally hostile and you feel unsafe. If you remain: ▪ Stay calm. ▪ Listen attentively. ▪ Be courteous, patient and respectful. ▪ Do not become angry and argue with or threaten the person. ▪ Maintain eye contact. ▪ Try to calm the person down by using a soothing voice and non-threatening body language. ▪ Keep the situation in your control. ▪ If they ask you to leave, do so. ▪ Contact field manager, your supervisor, and/or the local authorities (if needed) and report the incident.	**M**
6. Dealing with verbal abuse	Potential escalation to physical violence	▪ Leave the site if the verbal abuse is such that you feel unsafe. If you remain: ▪ Stay calm. ▪ Be courteous, patient and respectful. ▪ Do not become angry and argue with or threaten the person. ▪ Maintain eye contact. ▪ Try to calm the person down by using a soothing voice and non-threatening body language. ▪ Keep the situation in your control. ▪ If possible, signal a co-worker or supervisor that you need help. ▪ Report the incident to field manager and/or your supervisor.	**L**
7. Dealing with physical violence	Potential physical harm to you/individual, vehicles, equipment	▪ Stay calm. ▪ At the first sign of physical violence immediately back away. ▪ Protect yourself by trying to escape to a safe area. ▪ Do not challenge or try to subdue the assailant. ▪ The best defense is to get away. ▪ Report the incident to field manager, your supervisor, and the local authorities.	**M**
8. Dealing with a weapon	Potential physical harm to you/individual, vehicles, equipment	▪ Stay very calm. ▪ If possible quietly signal for help. ▪ Maintain eye contact. ▪ Stall for time. ▪ Keep talking but follow instructions from the person with the weapon. ▪ Don't risk harm to yourself or others by trying to be a hero. ▪ NEVER grab the weapon. ▪ Watch for a safe chance to escape to a safe area. ▪ Call 9-1-1 if you are able to and require emergency assistance. ▪ Report the incident to field manager, your supervisor, and the local authorities.	**H**

AHA – Hostile Public Interactions

9. Working in known hostile environments	Potential physical harm to you/individual, vehicles, equipment	▪ Coordinate with project managers, client, and/or local authorities to determine the best course of action. ▪ Document procedures and protocols and include as part of the HASP. ▪ Have client and/or local authorities coordinate and evaluate or “clear” the area before crew arrival.	L

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Minimum Recommended PPE*: steel-toed boots, safety glasses, chemical resistant gloves
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization	1A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2. General Site Hazards	2A) See JHA Field Work - General	2A) See JHA Field Work - General
	2B) Chemical exposure	2B) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.
3. Calibrate monitoring equipment	3A) Exposure to calibration gases	3A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Opening the well cap, taking water level readings	4A) Contact with poisonous plants or the oil from poisonous plants	4A) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Wear PPE as described in the HASP. ▪ Do not touch any part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
	4B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	4B) Contact with stinging/biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	4C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/ soil); liquid splash; flammable atmospheres.	4C) Exposure to hazardous substances ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Immediately monitor breathing zone after opening well to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP ▪ Monitor headspace in well. After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.
	4D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	4D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4E) Foot injuries from dropped equipment	4E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear Steel toed boots
5. Collecting water samples	5A) Fire/Explosion/Contamination hazard from refueling generators	5A) Fire/Explosion/Contamination hazard from refueling generators ▪ Turn the generator off and let it cool down before refueling ▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential ▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited ▪ See JHA for Gasoline use
	5B) Electrocution	5B) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	5C) Exposure to contaminants	5C) Exposure to Contaminants ▪ Stand up wind when sampling ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 4C) under Safe Practices above
	5D) Infectious water born diseases	5D) Infectious water born diseases ▪ Wear chemical resistant gloves and other PPE – as identified in HASP ▪ Prevent water from contacting skin ▪ Wash exposed skin with soap and water ASAP after sampling event ▪ Ensure that all equipment is adequately decontaminated using a 10% bleach solution
	5E) Exposure to water preservatives	5E) Exposure to water preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ When preserving samples always add acid to water, avoid the opposite. ▪ See JHA Working with Preservatives
	5F) Slips/trips/falls	5F) Slips/trips/falls ▪ Ground can become wet/muddy, created by spilled water ▪ Place all purged water in drums for removal ▪ Wear good slip resistant footwear
	5G) Repetitive Motion and other Ergonomic Issues	5G) Ergonomic Issues ▪ Use mechanical means where possible to raise and lower equipment into well. ▪ Alternate raising and lowering equipment between field sampling team members, and alternate bailing the well. ▪ Use safe lifting techniques.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
6. Sample Processing	6A) Contaminated water	6A) Contaminated water ▪ Wear appropriate PPE as identified in HASP ▪ Decontaminate outside of bottles ▪ Prevent water from contacting skin ▪ Work in well ventilated area – upwind of samples ▪ Waste will be returned to the operation office for storage and disposal
7. Shipping Samples	7A) Freeze burns, back strain, hazardous chemical exposure, sample leakage	7A) Freeze burns, back strain, hazardous chemical exposure, sample leakage ▪ Wear appropriate chemical resistant gloves as identified in HASP. ▪ Wear leather or insulated gloves when handling dry ice. ▪ Follow safe lifting techniques – get help lifting heavy coolers. ▪ Samples that contain hazardous materials under the DOT definition, must be packaged, manifested and shipped by personnel that have the appropriate DOT HAZMAT training.

Document Title	**Activity Hazard Analysis (AHA)** **Site Activities During Covid-19 Pandemic**	

Activity/Work Task:	**Travel To / From and Work at Project Site during Covid-19 Pandemic**			HSE-GDS-110002 Trigger Level where you're coming from	**2**	HSE-GDS-110002 Trigger Level where you're going to	**2**	Overall RAC	**L**
Project Location:	Franklin Cleaners; Hempstead, and Rockville Centre, NY			**Risk Assessment Code (RAC) Matrix**					
Project Number:	3616206112			**Severity**	**Probability**				
Date Prepared:	11/3/20	Date Reviewed:	11/5/20		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by / for (Name/Title):	Bradley LaForest/Project Manager			Catastrophic	**H**	**H**	**S**	**S**	**M**
				Critical	**H**	**S**	**S**	**M**	**L**
Reviewed by (Name/Title):	Katie Amann/Assistant Project Manager			Marginal	**S**	**M**	**M**	**L**	**L**
				Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following activity:
Precautions to be taken for prevention of Covid-19 exposure at home, travelling to and from the Project and working on the Project Site.

This AHA is not an exhaustive summary of all hazards associated with the Project or activity. Refer to the site HASP for additional requirements. Workers are to follow general site safety controls for; Slips, Trips and Falls; biological hazards; cuts lacerations and pinch points; and emergency response procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as H, S, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
H = High Risk
S = Substantial Risk
M = Moderate Risk
L = Low Risk



MANAGEMENT OF CHANGE: If there is a change or deviation from the planned activity, you must stop the job and re-evaluate the risk assessment and the precautions taken. Any changes to work described in this AHA shall require review by a Qualified Person.

Document Title	**Activity Hazard Analysis (AHA)** **Site Activities During Covid-19 Pandemic**	

Equipment to be Used	Training Requirements / Contact Information	Inspection Requirements
PPE as required by Site HASP. Additional PPE as required by risk assessment, such as use of a respirator in non-ventilated spaces (i.e. pump houses) or when social distancing cannot be achieved. Cellphone. Handwashing soap and/or hand sanitizer. Disinfecting wipes and disinfectant cleaners.	**Competent / Qualified Personnel:** North Atlantic HSE Lead: Jeff Tweeddale 860-670-5908 HSE Manager: Cindy Sundquist 207-650-7593 WorkCare: 888-449-7787 Emergency services: 911 See Emergency Contact List posted in the HASP for additional contacts if needed. **Training requirements:** • Site-specific HASP orientation • Review of applicable AHAs • Toolbox safety meeting • Task kickoff meeting • Wood Guide to Covid-19 presentation. • Any other trainings required by the site-specific HASP	Inspection of vehicle/equipment prior to operation. Note needed repairs and schedule service as soon as feasible. Inform supervisor if issues identified that will affect safe operation. Inspect all PPE prior to use. Perform an assessment to identify all areas and equipment with shared surfaces. Verify all areas and equipment identified with shared surfaces are disinfected with antimicrobial wipes prior to use. Check in regularly with yourself and other field staff to ensure hands are washed frequently and/or sanitized. Stay home if: • Feeling sick even if symptoms do not align with COVID-19; or • You have been in contact with someone believed to have the coronavirus or traveled to a foreign country

Job Steps	Hazards	RAC Inherent	Controls	RAC Residual
1. Pre-Work Preparation • Communicate hazards and controls to all employees and subcontractors involved in the Project - Tailgate - Unscheduled meeting - Town Hall • Manage Change • Be prepared	Failure to identify a hazard and subsequent potential for injuries, illness, damage, environmental impact, economic loss or business impact. Failure to prepare. Evaluate potential high-risk issues: Shared workspaces; Work tasks involving close contact of workers; etc. Workers unfamiliar with site safety requirements.	**M**	• Ensure workers understand scope of work, emergency response procedures and location of emergency response equipment on the Project. • Workers and supervisory staff involved with the work to be involved in the AHA generation process through pre-job safety discussion. • Assign trained, competent workers. Provide mentoring/coaching as needed for supplier trained personnel and trained Site workers. • Inform Site Superintendent/Field Lead and/or SSHO if high risk situation cannot be controlled or mitigated. • Superintendents/Field Leads to have contact list for all workers (text, email, phone) to be able to quickly update workers with any significant changes outside of work hours. • Individuals to stay up to date with current directives/procedures issued by civil authority.	**L**

	Unfamiliar with current global/local events and Wood/Government directives.		• Wood Project Management Team to stay up to date with current Wood directives/procedures through **Wood Occupational Health website** and emailed communications. • Keep workforce briefed on situation daily through tailgates and unscheduled H&S meetings, if needed. Postings in trailers to maintain awareness. • Utilize daily go/no go decision making specific to proposed tasks through use of Wood Daily Field Level Readiness Review (attached to tailgate daily). • Use of the Wood Declaration Form daily attached to tailgate. • All should be prepared for unexpected/sudden work shutdowns/civil restrictions i.e. have a plan and emergency kits/supplies available.	
2. Habits Outside Work • Social gathering • Shopping • Other high-risk activity for exposure	**Close Contact with others** • Compliance • High risk individuals • Non-compliance to physical distance directives • Hygiene • Visiting friends/relatives • Visiting people that have recently travelled	**M**	• Although it is a difficult transition, all must "**Manage Change**" and adjust to the current situation and follow the directives issued by various Medical Officer of Health (local, Provincial, Federal). • Understand the implications of non-compliance – you could be responsible for the death of another person. • Stay away from those individuals and establishments that are considered high risk (underlying health issues, old age homes etc.). • Do not go out and visit friends and relatives unless necessary. Curtail social habits. • Encourage those that are not "**Following the Rules**" to do so – "**Intervene**". • Practice social distancing (2 metres/6 feet from each other). • Make use of the numerous businesses now offering non-contact and free delivery of items. No need to actually go into a store for supplies. • Practice good hygiene, such as frequent hand washing. Use "**Correct PPE"** if needed (i.e. gloves). • Be familiar with the signs and symptoms of Covid-19. If at any time they develop, know what to do: self-assessment tool online (**https://www.ontario.ca/page/2019-novel-coronavirus**), call, follow directions.	**L**

	SARS-CoV-2 exposure in community	**M**	• Avoid public spaces and going out to eat by bringing your own lunch to the Project site. Ensure all personnel wash and/or sanitize their hands properly prior to eating. • While staying in a hotel, the following is recommended: - Eat all food in your hotel room after disinfecting surfaces. Do not eat in public spaces or restaurants. - Wash hands with soap and warm water for a minimum of 20 seconds or disinfect using hand sanitizer prior to eating. - If the hotel has a restaurant or café, order food to be picked up or delivered to your room. Minimizing time in public spaces. - If there is no food available at the hotel, order groceries or food for delivery to the hotel. Call local restaurants to order food for delivery (call the hotel lobby for recommendations) or use food ordering applications. Some of these applications have options for contactless delivery. • Prior to leaving the site: - Disinfect work areas (hard surfaces) and shared equipment you came into contact with during the work day. - Wash your hands thoroughly for a minimum of 20 seconds with soap warm water or disinfect using hand sanitizer prior to leaving the site. • When you arrive home: - Disinfect your cell phone with an approved antimicrobial wipe.	**L**
3. Mental Health • Stress • Fear • Anxiety	**Unexpected Reactions** • Anger • Violence • Breakdown	**M**	• Understand that all people are individuals and we all react differently to situations of high stress and change to normal routine in our lives. • Watch out for each other's wellbeing. • Don't be a downer affecting morale - keep a good attitude and stay positive. A good attitude will help maintain a positive atmosphere at home and work. • Think before you say – don't spread false news or gossip. • If you are feeling stress/anxiety that overwhelms you, seek out assistance. • Be prepared for an unexpected reaction to a comment or interaction.	**L**

Travel To/From Site • Staffing level. • Arrival protocols.	**Work Assignment** • Priority of task • Staffing	**M**	• Evaluate if it is necessary to go to Project or if you can effectively work remotely from home and be on call. • Superintendents/Field Leads to minimize to the extent possible the number of people on the Project based on the work to be performed and other considerations such as site conditions, weather. If staff will not be needed have them stay home on call. Subcontractors to be managed in the same way.	**L**
	Arrival at Site • Security protocols • Interactions with others	**M**	• Security attendant will sign you in to avoid needless sharing of pen etc. • Change procedure from subs obtaining dosimetry badge from security and handing in at end of day. Have a centralized location for them where workers can get their own. • Security attendant to screen all workers/visitors etc. attempting to enter the site based on the Wood Visitor Declaration Form. • Anyone with an issue identified through use of screening to be prevented from entering and the Superintendent to be notified to provide instruction. • Do not arrive for work too early unless justified. • When parking on-site, stay in vehicle until time for tailgate meeting. If getting out practice social/physical separation from others. • Do not gather with others in close groups.	**L**
	SARS-CoV-2 exposure • Illness. • Exposure to others.	**M**	• Do not travel if you are not feeling well. • Do not travel if someone you've had close contact with in the last 14-days has experienced fever, chills, or other virus related symptoms. • Do not travel with other individuals who are not feeling well or have been in close contact with individuals in the last 14-days who have experienced COVID-19 symptoms. • Do not travel if you have been in close contact with individuals who are healthcare professionals treating confirmed or suspected COVID-19 patients. • Travel to project site should limit the number of personnel per vehicle. Do not carpool is preferred. • Avoid touching high-contact surfaces within vehicles if operated by others. • Wash hands after exiting vehicle and avoid touching face/eyes/mouth while inside vehicle if its not yours.	**L**

			• Keep ventilation systems running (i.e. drawing in outside air) when inside vehicle or crack the window open for additional fresh air.	
Work at Site • Performing assigned work tasks with others. • Breaks. • Equipment use. • Shared facilities. • Tailgate meetings. • Business continuity.	**Shared Facilities/Equipment** • Lunch/Meeting Trailers • Admin Trailers • Washrooms • Equipment (dozer, excavator etc.) • Workspaces.	**M**	• Minimize to the extent possible the number of people in trailers at any one time. Tailgates and meetings to be limited such that social distancing can be accomplished. • If necessary, have multiple tailgate meetings, possibly by employer. For example, Drain Bros, Wood, others on-site in any particular day. • Investigate possibility/feasibility of phone in/Skype meetings and maximize use of alternative communications to mitigate face to face interactions and proximity of people. • Increase frequency of cleaning of facilities. Ensure good supply of cleaning supplies are on-hand/available. Assign workers to clean frequently used surfaces twice daily and if necessary, retain a contractor to supply this service. • Encourage all to understand that everyone needs to chip in and assist in keeping work areas clean. If in doubt, grab a cleaning cloth and wipe down surfaces. • Plan meals (i.e. lunch) so that microwave is not used to minimize contact between workers using a common piece of equipment. • To the extent possible limit equipment use to one operator. If required to share equipment, equipment to be wiped down between workers. • At the end of day, operators are to clean/wipe down control surfaces in the unit so it is ready for the next days work in case another operator is assigned. • If a second operator is assigned to a specific unit in a day, first operator performs a wipe down, opens window and leaves unit running for ventilation. New operator to wait 5 minutes before getting in and operating. • Where two people work in the same office, one to move out to another space or evaluate if remote work from Project is possible. • Shared offices need to be cleaned after use before another person uses that space. • Stagger breaks so that not everyone is using facilities at the same time depending on the number of staff on-site. Social distancing needs to be maintained. •	**L**

	Personal Hygiene • Washing. • Personal habits.	**M**	• Avoid touching face, especially nose, eyes. • Wash hands frequently. Before and after eating; after you have been in a public place; after using the washroom; after coughing and sneezing; after touching surfaces that other people also touch. • Use a tissue if experiencing runny nose and dispose. Alternatively cough and/or sneeze into the crook of arm. • Where there is common, frequent contact of rails, door knobs etc., consider use of nitrile gloves for work outside of the controlled zones to control direct contact with common surfaces. • Increase frequency of glove change out in all Zones.	**L**
	Performance of Work Tasks • Work involving close contact between workers. • UTV use.	**M**	• Perform risk assessment prior to task to mitigate hazard of close contact. Consider type of work, duration involving close contact (incidental or long term). For long term work (hours) it should be postponed, or another way found to complete the task. • If necessary, use half or full-face respirator as a mitigation if workers cannot practice physical distancing requirements (i.e. labour work). If the task requires long term (hours) continuous work in close proximity to a coworker consider postponing such tasks. • If unsure how to mitigate, involve supervisor and/or PHSO. • Avoid operation of UTVs with a full load if possible (i.e. make multiple trips). Run with windows open for ventilation if necessary. • Ventilation systems to be always operated in the cabs of heavy equipment to ensure good fresh air exchange.	**L**
	Communication • Lack of awareness.	**M**	• Promote awareness by posting Wood HSSEA supplied materials. • Hand washing posters. • Hold unscheduled H&S meetings to communicate new information.	**L**
	Business Continuity	**M**	• Those workers with a laptop should be taking it home at night. • Test internet connections at home to identify issues to be rectified. • All with the ability should be prepared to work from home if the situation arises where the civil authority issues shut down controls.	**L**

Emergency Response • Illness at work • Performing first aid. • CPR.	**Becoming ill at work** • Experiencing any symptoms of illness. • Observing someone ill.	**M**	• Immediately notify supervisor and isolate yourself from all others. Wait for instruction. • If you become aware of an individual who does not appear to feel well and has not indicated so**, "Intervene".**	**L**
	Providing First Response in advance of responding agency • Close contact	**M**	• As with all first aid situations, any individual has a choice as to provide first aid or not. • If you are asked to be a Site first aider for the day as noted on tailgate say no if you are not comfortable doing so. • If CPR is required only do chest compressions. If AR is required in addition to CPR use a rescue breather mask. • Use a face shield if risk assessment determines one is needed.	**L**

AHA REVIEW ACKNOWLEDGEMENT		
Reviewed by (PM):	Signature:	Date:
Plan Concurrence by (other): Katie Amann	Signature: 	Date: 11/5/2020
The undersigned acknowledge they have read, understood and shall comply with all components of the AHA. This AHA is a living document and should be reviewed and revised during regular meetings with the Wood team.		
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Activity/Work Task:	Travel To / From Office or Project Site during Covid-19 Pandemic			HSE-GDS-110002 Trigger Level where you're coming from	2	HSE-GDS-110002 Trigger Level where you're going to	2	Overall RAC S
Project Location:	Franklin Cleaners; Hempstead, and Rockville Centre, NY							
Project Number:	3616206112							
Date Prepared:	11/3/20	Date Reviewed:	1/19/2021					
Prepared by / for (Name/Title):	Bradley LaForest/Project Manager							
Reviewed by (Name/Title):	Katie Amann/Assistant Project Manager							

Notes:

This AHA is not an exhaustive summary of all hazards associated with the field activities or project site. Refer to the site Emergency Action Plan provided by the local office or project site. This AHA is intended to provide Wood personnel a safety framework for mobilizing to the physical Wood office or field location at a Wood-controlled or client-controlled worksite. This AHA review and update should be completed in parallel with the HSSE Field Readiness Checklist.

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	H	H	S	S	M
Critical	H	S	S	M	L
Marginal	S	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **H = High Risk**
- **S = Substantial Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used

PPE as required by the office / job site
Cellphone
First Aid kit
Safety Vest
Sunglasses
Handwashing soap and/or hand sanitizer
Disinfecting wipes and EPA-recommended disinfectants

Contact Information

Competent / Qualified Personnel:
North Atlantic HSE Lead: Jeff Tweeddale 860-670-5908
HSE Manager: Cindy Sundquist 207-650-7593
WorkCare: 888-449-7787
Emergency services: 911

See Emergency Contact List posted in the HASP for additional contacts if needed.

Inspection Requirements

Inspection of vehicle prior to operation. Note needed repairs and schedule service as soon as feasible.
Inspect all PPE prior to use.
Perform an assessment to identify all areas and equipment with shared surfaces. Verify all areas and equipment identified with shared surfaces are disinfected with antimicrobial wipes prior to use.

Check in regularly with yourself and other field staff to ensure hands are washed frequently and/or sanitized.

Stay home if:

- Feeling sick even if symptoms do not align with COVID-19; or
- You have been in contact with someone believed to have the coronavirus or traveled to a foreign country or out of state.

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Job Steps	Hazards	Controls	RAC
1. Prepare for travel	1A) Mental health, family concerns	▪ Ops management to limit personnel deployed to projects to individuals whose presence on the project site would be considered "essential" for work. ▪ Plan to use multiple vehicles, where possible with respect to social distancing recommendations. ▪ Communications are assessed routinely with site personnel including use of ISOS app, cellphone coverage, email, and Skype/Teams messaging. ▪ Ensure you have all materials with you necessary to conduct work effort including handwashing supplies. ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current (e.g. WorkCare, download ISOS app (Instruction), coordinate with Global Mobility, etc.). ▪ Ensure all workers are fit for duty (alert, well rested, no underlying medical conditions that would increase severity or susceptibility to infectious illness, and mentally and physically fit and willing to perform work assignment). ▪ Familiarize yourself with route to destinations (e.g. home to airport, airport to hotel, hotel to site, etc.). ▪ Ensure that a copy of the current insurance certificates and incident reporting procedures/forms are available during travel (some documents are appended to this AHA). ▪ Ensure you have reviewed latest geographic updates for COVID-19 risk within the location you are travelling to, and where you're coming from, including airport layovers and considerations for international and intrastate entry upon return. ▪ Be prepared for possible quarantine events or shelter-in-place mandates from local officials.	L
	1B) Vehicle defects	Inspect vehicle for defects such as: ▪ Inadequate fluids (e.g., fuel, antifreeze, oil, windshield washer) ▪ Worn/flat tires ▪ Windshield wipers loose, worn, or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working ▪ Exterior or interior damage (e.g., scratches, dents)	L
	1C) Insufficient emergency equipment, unsecured loads	▪ Ensure vehicle has first aid kit (if first aid kits are not provided at the site); bring medications for allergic responses if necessary. ▪ Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work. ▪ Cell phones are recommended to call for help in the event of an emergency. Ensure cellphone provider has coverage in location of travel prior to departure. ▪ Vehicles carrying tools must have a safety cage in place; all tools must be properly secured. ▪ Ensure parking cones are present, if applicable.	L

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Job Steps	Hazards	Controls	RAC
2. Travelling to site or airport	2A) Collisions, unsafe driving conditions	▪ Drive defensively! And complete a Journey Management Plan. ▪ Cell phone us is prohibited while driving, including hands free! ▪ Do not use cruise control during inclement weather. ▪ Do not drive more than 300 miles per day or for extended distances from 11:00pm to 5:00 am. ▪ Do not eat or use tobacco products in the vehicle. ▪ No unrestrained pets or nonwork riders (e.g., hitch hikers, family members, significant others) allowed in vehicles. ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions. ▪ Maintain adequate following distance. ▪ Pull over and stop if you have to look at a map or use a cell phone. ▪ Try to park so that you don't have to back up to leave. ▪ If backing is required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary.	**M**
	2B) Taxi / Uber / Lyft / driver service - unsafe driving or personal security concerns	▪ Minimize the time that you're standing outside by yourself with your phone in your hand. Instead, wait inside until the app shows that your driver has arrived. ▪ Make sure you're getting into the right car with the right driver by matching the license plate, car make and model, and driver photo with what's provided in your app. Never get in a car where the vehicle or driver identity doesn't match what's displayed in your app. ▪ Have the driver confirm your name. To safely exchange names, you can ask, "Who are you here to pick up? ▪ Whenever possible, sit in the back seat, especially if you're riding alone. This helps ensure that you can safely exit on either side of the vehicle to avoid moving traffic, and it gives you and your driver some personal space. ▪ Always wear your seatbelt! ▪ Share your trip details with your supervisor, friends, or family members. ▪ Request to end the ride if you ever feel unsafe during the trip. ▪ If you're in an urgent situation, call 911 or emergency services phone number.	**M**
	2C) Intersections	▪ Proceed carefully through intersections ▪ Ensure that cross traffic has stopped before proceeding, especially if the light has just turned green. Look out for drivers running red lights! ▪ When merging into traffic or turning, ensure vehicles in front have merged/turned (and not stopped) prior to proceeding.	**M**
	2D) Dusty, winding, narrow roads	▪ Go slow around corners, occasionally clearing the windshield.	**M**

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Job Steps	Hazards	Controls	RAC
	2E) Rocky or one-lane roads	▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.	M
	2F) Stormy weather	▪ Inquire about conditions before leaving the hotel or office. ▪ Be aware of oncoming storms.	M
	2G) When angry or irritated	▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	M
	2H) Turning around on narrow roads	▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a spotter if available.	M
	2I) SARS-CoV-2 exposure NOTE: *If Trigger Level to/from is 1, then insert L for RAC. If Trigger Level to/from is 2 or 3, then insert M for RAC.* *Any work inside a healthcare facility is Substantial to High risk and prohibited*	▪ Do not travel when not feeling well. ▪ Do not travel if someone you've had close contact with in the last 14-days has experienced fever, chills, or other related symptoms. ▪ Do not travel with other individuals who are not feeling well or have been in close contact with individuals in the last 14-days who have experienced COVID-19 symptoms. ▪ Do not travel if you have been in close contact with individuals who are healthcare professionals treating confirmed or suspected COVID-19 patients. ▪ Cleanliness of vehicle assessed along with regular cleaning intervals. ▪ Travel to project sites and airport should limit the number of personnel per vehicle (i.e. no travelling invan with multiple personnel to project sites). ▪ Avoid touching high-contact surfaces within vehicles. ▪ Wash hands after exiting vehicle and avoid touching face/eyes/mouth while inside vehicle. ▪ Keep ventilation systems running when inside vehicle or crack the window open for additional fresh air.	M
	2J) On wet or slick roads	▪ Drive slow and safe.	M
	2K) Animals on road	▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas	S
	2L) Vehicle accident	▪ Employees should follow Wood vehicle operation policy and be aware of all stationary and mobile vehicles.	S

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Job Steps	Hazards	Controls	RAC
3. Parking at job site or airport parking and movement to site location or airport	3A) Striking other vehicles, objects	▪ Choose parking spot that is away from other vehicles, if possible. ▪ Choose a spot that will allow the driver to drive forward when leaving the site. ▪ Back into parking spots, or pull through when parking in perpendicular parking spaces (drive forward into angle/herring bone type parking spots).	M
	3B) Leaving parking spaces	▪ Walk around the vehicle before leaving and identify hazards (low lying objects, location of other vehicles or pedestrians, other vehicles with drivers that may be leaving at the same time, etc.) ▪ If backing is unavoidable, use a spotter if a second person is available; if no spotter available, back slowly, checking for other vehicles, pedestrians, etc.	M
	3C) Slips, trips, and falls using walking surfaces, stairways, ramps, escalators, etc.	▪ Ensure that aisles are correctly established and clear, no tripping hazards are evident, floors are even, wires are not streched across aisles, entrance mats are available and used for wet weather, floors are dry-not slippery, and carpets/rugs are secure. ▪ Ensure that adequate lighting- suitable for walking and say on locations treated for potentially icy conditions. ▪ Stick to ramps, walkways, corridors with a nonslip surface. ▪ Use proper body mechanics when lifting supplies, luggage, equipment, etc. Do not attempt to carry more than 50 lbs; utility rolling wheels, hand cart, etc. for assistance.	L

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Job Steps	Hazards	Controls	RAC
	3D) SARS-CoV-2 exposure in airports and on airplane, and ground transportation at airports NOTE: *If Trigger Level to/from is 1, then insert L for RAC. If Trigger Level to/from is 2 or 3, then insert M for RAC.* *Any work inside a healthcare facility is Substantial to High risk and prohibited*	▪ Travel to be booked routing outside of potential high community transmission transport hubs. ▪ Temperature monitoring taking place by security personnel. ▪ Wash your hands often or use hand sanitizer. Wash your hands for at least 20 seconds; remember to lather the backs of the hands, between the fingers, and under the nails. Use a hand sanitizer that contains at least 60 percent alcohol. Cover all surfaces of your hands and rub them together until they feel dry. Avoid touching your eyes, nose, and mouth with unwashed hands. Cover your mouth and nose if you sneeze or cough with a tissue or use the inside of your elbow and throw used tissues in the trash. Follow up with hand washing or hand sanitizer. Bring your own hand sanitizer (up to 12 ounces allowed in carry on). ▪ Pack disinfecting wipes in your carry on and use them to wipe down common areas throughout the airport from check in, to gate, to plane. Touch screens, door handles, seating and dining areas, as well as frequently-used objects that you touch with your hands should all be wiped down. Bleach-based wipes and solutions with at least 60 percent alcohol can kill the coronavirus. Once you're seated on the plane, use disinfecting wipes to clean the hard surfaces like the head and arm rest, the seatbelt buckle, the remote, screen, seat back pocket, and the tray table. ▪ When we're traveling, many of us place pens, boarding passes, parking tickets, and more into our mouths without even noticing it and then hand those items to other people like parking attendants, Transportation Security Administration (TSA) officers, or flight crew. Be conscientious about keeping your hands or other items out of your mouth. ▪ During your travel journey, look for opportunities to stay six feet, or an arm's length from others. One of the ways coronavirus is spread is between people who are in close contact with one another or through respiratory droplets with an infected person coughs or sneezes. ▪ Protect other people from infection and give yourself the time you need to recuperate by staying home if you are not feeling well. ▪ Avoid travelling in vans or buses with multiple personnel, keep distance between seats if you must.	**M**

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Job Steps	Hazards	Controls	RAC
4. Travel back /forth to hotel, home, restaurants, recreation, airport, etc.	4A) Hazards from criminal activity / security / social unrest	▪ Always plan the trip (Journey Management Plan) prior to leaving or returning. ▪ Drive with the vehicle doors locked. ▪ Keep plenty of gas in the vehicle's tank. ▪ Observe all local traffic laws. ▪ Stay in area where there are other people. Use restroom facilities that are located near to public areas. Be aware of people around you. ▪ Pick hotels that are located in the safest part of town and when possible, have good security. ▪ Move quickly when going from the parking lots to the hotel. ▪ Park as close to lighting as possible. ▪ Look in the vehicle prior to entering to see if anyone is hiding in the vehicle. ▪ If you feel threatened, scream, yell and run. Don't be a hero. ▪ Request a room located on the 7th floor or below (fire truck ladders will reach to the 7th floor). Learn the emergency exit route from your room upon arrival. Always keep your room door locked and bolted.	L

Job Steps	Hazards	Controls	RAC
	4B) SARS-CoV-2 exposure in community NOTE: *If Trigger Level to/from is 1, then insert L for RAC. If Trigger Level to/from is 2 or 3, then insert M for RAC.* *Any work inside a healthcare facility is Substantial to High risk and prohibited*	▪ Avoid public spaces and going out to eat by bringing your own lunch to the project site. Ensure all personnel wash and/or sanitize their hands properly prior to eating. While staying in a hotel, the following is recommended: ▪ When booking confirm the hotel has an ehanced cleaning procedure for high-touch public areas (elevators, door handles, lobbies, room keys) in response to the pandemic. ▪ Confirm hand sanitizers for staff and guest are located through the facilty, including front desk. ▪ Confirm hotel has a procedure to identify if staff are Covid-19 high risk, and if so, is this procedure followed (e.g. self quarantine). ▪ Confirm if they require a guest to complete a Covid-19 questionnaire before assigning a room. ▪ Confirm that staff have taken enhanced Covid-19 awareness training. ▪ Eat all food in your hotel room after disinfecting surfaces as outlined above. Do not eat in public spaces or restaurants. ▪ Wash hands with soap and warm water for a minimum of 20 seconds or disinfect using hand sanitizer prior to eating. ▪ If the hotel has a restaurant or café, order food to be picked up or delivered to your room. Follow guidelines for minimizing time in public spaces in section 4D above. ▪ If there is no food available at the hotel, order groceries or food for delivery to the hotel. Call local restaurants to order food for delivery (call the hotel lobby for recommendations) or use food ordering applications such as Postmates, Caviar, and Doordash. Some of these applications have options for contactless delivery. Prior to leaving the site: ▪ Disinfect shared equipment you came into contact with during the work day. ▪ Wash your hands thoroughly for a minimum of 20 seconds with soap warm water or disinfect using hand sanitizer prior to leaving the site. When you arrive home: ▪ Disinfect your cell phone with an approved antimicrobial wipe. ▪ Wash hands thoroughly for a minimum of 20 seconds with soap and warm water.	**M**

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Daily Field Level Readiness Review- Covid-19 Updates* **Employee Name =** **Name of Site and Project Location =** **Project number =**	**Enter Date Below**						
The work today is business essential (i.e. can't be done remotely or postponed).							
If outside your home country, travel is still allowed within this geography.							
If outside your home country, travel is still allowed back into your home country.							
State/provincial/local governments still allow travel from my home to this project destination.							
State/provincial/local governments still allow travel from this project destination back to my home.							
If visiting a client's facility, the client is still open for business and visitors/contractors are allowed.							
Work is still allowed in the area where this project is located (state / provincial / local government has not implemented a shelter in place mandate that would restrict the employee's ability to complete work tasks).							
Hotels are open and available in the area.							
Employees are able to get meals (e.g. restaurants, grocery stores, etc.).							
Adequate supplies of work required PPE (e.g. respirators, protective clothing) are available.							
Gasoline is available for purchase.							
Adequate supplies of disinfectants (e.g. wipes, sprays) are available for cleaning.							
Facilities are available for employees to frequently wash hands (or sanitizer is available).							
Work activities remain LOW to MODERATE risk for COVID-19 exposure.							

*All readiness boxes must be checked in order to continue operations for today. If any boxes are not checked, re-evaluate with Manager/Supervisor on "essential" of field work.

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

AHA REVIEW ACKNOWLEDGEMENT		
Reviewed by (PM): Bradley LaForest	Signature:	Date:
Plan Concurrence by (other): Katie Amann	Signature: 	Date: 11/5/2020
The undersigned acknowledge they have read, understood and shall comply with all components of the AHA. This AHA is a living document and should be reviewed and revised during regular meetings with the Wood team.		
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:
Name (print):	Signature:	Date:

HSSE Field Readiness Checklist/COVID-19 Considerations

Project Name: _____ **Date(s) of travel:** _____

Project Location (city, county, state/province): _____

Describe work to be conducted: _____

This form serves as the COVID-19 risk assessment for travel. If any questions in the Project or Team Members Go/No Go Decision Process sections is answered "No," travel are prohibited for the project or individual. If exemptions must be made, contact your HSSE Manager.

Project Go/No Go Decision Process				
Criteria	**Yes**	**No**	**NA**	**Comment**
Travel is not allowed if any applicable question in this section is answered "No"				
1. Is travel considered essential (can't be done remotely or postponed)? See Guidance on Non-Essential Travel	☐	☐	☐	
2. If project is outside the country, is travel to that country allowed? Check latest Wood COVID-19 Travel and Business Updates	☐	☐	☐	
3. If project is outside of the country, is travel allowed back into the country that the employee resides?	☐	☐	☐	
4. Do state/provincial/local governments allow travel from home to project destination?	☐	☐	☐	
5. Do state/provincial/local governments allow travel from project destination back home?	☐	☐	☐	
6. Are home and project locations of similar risk levels (where travel from a high-risk location will not potentially impact low risk area)?	☐	☐	☐	
7. If visiting a client's facility, are they open? Are visitors allowed?	☐	☐	☐	
8. If doing work at other business locations, are they open?	☐	☐	☐	
9. Is work allowed in area where project is located (state / provincial / local government has **not** implemented a shelter in place mandate that would restrict the employee's ability to complete work tasks)?	☐	☐	☐	
10. Are hotels open and available in area?	☐	☐	☐	
11. Will employees be able to get meals while traveling?	☐	☐	☐	
a. Are restaurants open in the area (including takeout)? or				
b. Are grocery stores open (food available in stores)? and				
c. Employees able to prepare meals and store food in hotel room (hotel room has refrigerator and microwave)?				
12. Are vehicles available for rent, if applicable?	☐	☐	☐	

Project Go/No Go Decision Process				
Criteria	**Yes**	**No**	**NA**	**Comment**
13. Will gasoline be available for purchase?	☐	☐	☐	
14. If the work requires specific PPE (e.g., respirators):				
a. Is all required PPE available? *If N95 respirators are not available a higher level of respirators can be used (e.g., cartridge, supplied air, etc.).*	☐	☐	☐	
15. Are disinfectants (wipes, sprays) available or can outside cleaning services be used for routine cleaning and disinfecting? *NOTE: verify cleaners would be allowed to clean without additional site-specific training (e.g., HAZWOPER).*	☐	☐	☐	
16. Are facilities available for employees to frequently wash hands or if not, is hand sanitizer available?	☐	☐	☐	
17. Is work of low or moderate COVID-19 risk? *Work does not involve substantial risk of COVID-19 exposure type tasks (e.g., work conducted in a health care facility or medical laboratory).*	☐	☐	☐	

Team Members Go/No Go Decision Process				
Criteria	**Yes**	**No**	**NA**	**Comment**
18. Have potential travelers reviewed the Wood Guide for people at risk of serious coronavirus illness document to verify if they meet the criteria and should avoid traveling? Have they completed the Employee Wood Guide for People at Risk of Serious Coronavirus Illness Acknowledgment Form?	☐	☐	☐	
19. If any employees have been potentially exposed to COVID-19 (close contact) are they self-quarantined and prohibited from travel? (Must complete self-declaration form)	☐	☐	☐	
20. Are employees comfortable traveling (vs. commuting or day trips) and aware that they may be detained, have difficulty getting home, or otherwise required to self-quarantine at the project location or at home?	☐	☐	☐	
21. Do employees have sufficient quantities of prescription medication to bring while on business travel in the event of quarantine or delays getting home? Or can they acquire it locally?	☐	☐	☐	
22. Have subcontractors completed a declaration that indicates that they are admissible to a work site (must complete a declaration form)?	☐	☐	☐	

Team Members Go/No Go Decision Process				
Criteria	**Yes**	**No**	**NA**	**Comment**
23. Are all employees and subs who are required to wear PPE trained, qualified, medically cleared/fit tested (if required/ applicable)?	☐	☐	☐	

Considerations for all Field Projects		
Criteria	**Controls Included in AHA**	**NA**
If criteria are applicable, include controls in HASP, site-specific Field COVID-19 AHA, or attached applicable Wood COVID-19 documents.		
24. Multiple employees traveling to same project site. Determine best method of transportation. *Considerations should include methods to maintain social distancing (e.g., employees traveling in their own vehicle (personal/rental) vs. carpooling.*	☐	☐
25. Evaluate the possibility of employees needing to self-isolation/quarantine when returning to their homes? Required when returning home from a location where local jurisdiction has implemented restrictions such as closing all but essential businesses or requiring shelter in place.	☐	☐
26. Evaluate the possibility of employees being put in self-isolation/ quarantine when arriving at the portal (e.g., airport) of their destination?	☐	☐
27. Develop an emergency plan on how to handle situations where employee is unable to return home should air travel be banned (e.g., are one-way vehicle rentals, trains, buses, etc. viable options)?	☐	☐
28. Implement social distancing on project site (See guide to social distancing).	☐	☐
29. Implement procedures to clear visitors prior to accessing the workplace? (LINK)	☐	☐
30. Develop plan on what to do should an employee become ill while on business travel? *Consider: What can be done if employee is kicked out of hotel due to illness/positive COVID-19 test, if they can stay, does the hotel have room service, how will the employee be transported to a hospital if medical care is required, how will employee get home, etc.*	☐	☐
31. Develop plan on what to do if there is an infection on project site (employees/subcontractors/third-party).	☐	☐
32. Account for potential last-minute changes in travel schedule due to COVID-19. Prior to trip and during entire project work.		☐
33. Complete Journey Management Plan if driving to project site. *Include COVID-19 as criteria to consider*		☐

Considerations for all Field Projects		
Criteria	**Controls Included in AHA**	**NA**
If criteria are applicable, include controls in HASP, site-specific Field COVID-19 AHA, or attached applicable Wood COVID-19 documents.		
34. Ensure all employees have installed the International SOS app on their smart phones and are aware of how to use it? (LINK) (Wood membership number: **14AYCA804666)**		☐
35. If bringing samples or materials back to office or lab, is, verify if office is open according to state/provincial/local government requirements.		☐
36. Verify that the number of workers on the project fall within state/ provincial/ local governmental regulations for maximum permitted assembly.		☐
37. Evaluate restrooms availability/sanitation/toilet paper availability.		☐
38. Assure proper hygiene materials and supplies available in sufficient quantities, trained to use materials, etc., on project sites		☐

Manager/ Project Manager Approval: _____ Date: _____

HSSE Coordinator / Qualified Person Approval: _____ Date: _____

Links:

Wood Coronavirus Webpage And Frequently Asked Questions (LINK)

Wood Guidance documents

- Wood COVID-19 Guidance
- Coronavirus Risk Assessments Library
- Guidance on safety while travelling
- Guidance on non essential travel
- Guide for those at risk of serious illness
- Guidance on self-isolation
- Know the difference
- Guide to successful home working
- Guide to social distancing
- Looking after your mental health in a pandemic
- Stress and Coronavirus
- Tactical pandemic preparedness checklist
- CDC guide on speaking to children about coronavirus
- Mindtools resources

E&IA Coronavirus SharePoint site (LINK)

AHA – TRAVEL TO / FROM OFFICE OR PROJECT SITE, DURING COVID-19 CONSIDERATIONS

Daily Field Level Readiness Review- Covid-19 Updates* **Employee Name =** **Name of Site and Project Location =** **Project number =**	**Enter Date Below**						
The work today is business essential (i.e. can't be done remotely or postponed).							
If outside your home country, travel is still allowed within this geography.							
If outside your home country, travel is still allowed back into your home country.							
State/provincial/local governments still allow travel from my home to this project destination.							
State/provincial/local governments still allow travel from this project destination back to my home.							
If visiting a client's facility, the client is still open for business and visitors/contractors are allowed.							
Work is still allowed in the area where this project is located (state / provincial / local government has not implemented a shelter in place mandate that would restrict the employee's ability to complete work tasks).							
Hotels are open and available in the area.							
Employees are able to get meals (e.g. restaurants, grocery stores, etc.).							
Adequate supplies of work required PPE (e.g. respirators, protective clothing) are available.							
Gasoline is available for purchase.							
Adequate supplies of disinfectants (e.g. wipes, sprays) are available for cleaning.							
Facilities are available for employees to frequently wash hands (or sanitizer is available).							
Work activities remain LOW to MODERATE risk for COVID-19 exposure.							

*All readiness boxes must be checked in order to continue operations for today. If any boxes are not checked, re-evaluate with Manager/Supervisor on "essential" of field work.

Declaration Form (Covid-19)

Prior to entering this facility/site, or mobilizing to visit an office/site, review the questions below and make a declaration if your response to the questions all are 'No.'

If your response to any of the questions is 'YES' then we regret to inform you that you are not to come to work or visit any Wood office/site at this time.

1. Have you, or anyone whom you share a residence with, been in contact with any person suffering or suspected to be suffering from Covid-19 in the last 14 days?
2. Do you have any fever or respiratory symptoms (e.g. cough, sore throat or breathing difficulty)?
3. Have you visited any countries on Wood's restricted list in the last 14 days? *This is area dependent.*

By signing below, it is your declaration that your responses to the questions above is NO, and that this declaration is true and accurate to the best of your knowledge.

Use your own pen (if possible) and/or disinfect regularly shared tools/equipment; and, practice good hand hygiene using soap/water, or hand sanitizer.

Name	Company	Signature	Date

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Hydrochloric Acid
CAS Number: 7647-01-0
Synonyms: Muriatic Acid; Hydrogen Chloride
Note: HCL aqueous form of Hydrogen Chloride gas

HEALTH HAZARD DATA

Color:	Colorless to slighly yellow
Physical State:	Solid ; Liquid X ; Gas
Odor:	Pungent, irritating odor
Odor Threshold:	0.255 - 10.06 ppm
Vapor Density:	
Ionization Potential (IP):	N/A
IDLH:	50 ppm

Carcinogen: OSHA ; IARC ; NTP ; ACGIH ; NIOSH

Skin absorbabl Yes ; No X
Skin corrosive: Yes X ; No

Signs/Symptoms of Acute Exposure:
Irrritation to the nose, throat, larynx. Cough, choaking, dermatitis, eye and skin burns

Source	TWA (units) ppm	STEL (units) ppm	C (units) ppm
OSHA PELs			C5
ACGIH TLVs			C2
NIOSH RELs			C5

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Colormetric Tubes - Hydrochloric Acid 1/a tube	Dräger	Test pump by puttihg unopened tube and depressing Pump should remain collapsed	N/A	1 ppm

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits: Polycoated Tyveks - low conc.; Saranex - pure form
Gloves: Neoprene, rubber, nitrile, PVC
Boots: Rubber

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 = 10 ppm
MUC Full-Face APR = TWA x 10 = 10 ppm

FIRE/REACTIVITY DATA

Flash Point: N/A

LEL/UEL: N/A

Fire Extinguishing Media:
Dry Chemical ; Foam
Water Spray ; CO_2

Incompatibilities:
Hyhdroxides, amines, alkalis, copper, brass, zinc
Highly corrosive to metals.

Checked by: Date: 5/10/2007

2003 by MACTEC Engineering & Consulting, Inc.

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Methanol
CAS Number: 67-56-1
Synonyms:
Methyl alcohol; Carbinol; Columbian spirits; Pyroligneous spirit, wood alcohol

HEALTH HAZARD DATA

Color:	Colorless
Physical State:	Solid / Liquid X / Gas
Odor:	Pungent
Odor Threshold:	0.42-5,960 ppm
Vapor Density:	1.1
Vapor Pressure	96 mmHg
Ionization Potential (IP):	10.84 eV
IDLH:	6,000 ppm

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH ___

Skin absorbabl Yes X No ___

Skin corrosive: Yes ___ No X

Signs/Symptoms of Acute Exposure:
Irritates eyes, skin, upper resp system; headache, drowsiness, dizziness nausea, vomiting. Visual disturbances Optic nerve damage (blindness), dermititis

Source	TWA (units) ppm	STEL (units) ppm	C (units) ppm
OSHA PELs	200 ppm		
ACGIH TLVs	200 ppm	250 ppm	
NIOSH RELs	200 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID with 11.7 eV lamp	Any	100 ppm isobutylene	0.23	45 ppm*

* Upgrade to Level B. Cannot use Level C PPE

Checked by: Cindy Sundquist Date: 4/19/2010

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Saranex

Gloves: Rubber or neoprene viton. Low ppm: nitrile

Boots: Butyl rubber

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 = N/A

MUC Full-Face APR = TWA x 10 = N/A

FIRE/REACTIVITY DATA

Flash Point: 52ºF

LEL/UEL: 4.9%/20.7%

Fire Extinguishing Media:
Dry Chemical ___ Foam ___
Water Spray ___ CO_2 ___

Incompatibilities:
Strong Oxidizers

First Aid:
Irrigate eyes, flush skin with water; provide breathing support; seek immediate medical attention if swallowed

2003 by MACTEC Engineering & Consulting, Inc.

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

SAFETY DATA SHEET

Isobutylene

Section 1. Identification

GHS product identifier : Isobutylene

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

SDS # : 001031

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

CAS number/other identifiers

CAS number : 115-11-7

Product code : 001031

Ingredient name	%	CAS number
Isobutylene	100	115-11-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Isobutylene	**ACGIH TLV (United States, 3/2015).** TWA: 250 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied compressed gas.]

Color : Colorless.

Molecular weight : 56.12 g/mole

Molecular formula : C4-H8

Boiling/condensation point : -6.9°C (19.6°F)

Melting/freezing point : -140.7°C (-221.3°F)

Critical temperature : 144.75°C (292.6°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -76.1°C (-105°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 9.6%

Vapor pressure : 24.3 (psig)

Vapor density : 1.94 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.6845

Gas Density (lb/ft ^{3}) : 0.1496 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.263 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

SADT : Not available.

Section 9. Physical and chemical properties

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Section 11. Toxicological information

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Isobutylene	2.34	-	low

Section 12. Ecological information

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1055	UN1055	UN1055	UN1055	UN1055
UN proper shipping name	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** 19, T50	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2). **Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden **Special provisions** 29	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act (CAA) 112 regulated flammable substances: isobutylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Isobutylene	100	Yes.	Yes.	No.	No.	No.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

International lists

National inventory

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : This material is listed or exempted.

Malaysia : Not determined.

Section 15. Regulatory information

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Canada

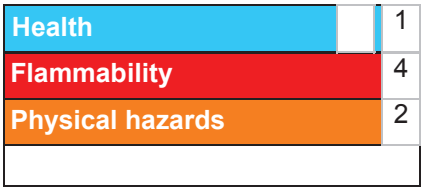
WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Flam. Gas 1, H220 Press. Gas Liq. Gas, H280	Expert judgment Expert judgment

History

Date of printing : 7/11/2016

Date of issue/Date of revision : 7/11/2016

Date of previous issue : No previous validation

Section 16. Other information

Version : 0.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

1 Identification of the substance/mixture and of the supplier

1.1 Product identifier

Trade Name: Alconox
Synonyms:
Product number: Alconox

1.2 Application of the substance / the mixture : Cleaning material/Detergent

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer
Alconox, Inc.
30 Glenn Street
White Plains, NY 10603
1-914-948-4040

Supplier
Not Applicable

Emergency telephone number:
ChemTel Inc
North America: 1-800-255-3924
International: 01-813-248-0585

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:
Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

2.2 Label elements:

Skin irritation, category 2.
Eye irritation, category 2A.

Hazard pictograms:



Signal word: Warning

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Additional information: None.

Hazard description
Hazards Not Otherwise Classified (HNOC): None

Information concerning particular hazards for humans and environment:
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:
The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients

3.1 Chemical characterization : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	12-28
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	2-16

3.4 Additional Information : None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:
Maintain an unobstructed airway.
Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:
Wash affected area with soap and water.
Seek medical attention if symptoms develop or persist.

After eye contact:
Rinse/flush exposed eye(s) gently using water for 15-20 minutes.
Remove contact lens(es) if able to do so during rinsing.
Seek medical attention if irritation persists or if concerned.

After swallowing:
Rinse mouth thoroughly.
Seek medical attention if irritation, discomfort, or vomiting persists.

4.2 Most important symptoms and effects, both acute and delayed

None

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None

5.2 Special hazards arising from the substance or mixture :

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Protective equipment:

Wear protective eye wear, gloves and clothing.
Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures :

Ensure adequate ventilation.
Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None

7 Handling and storage

7.1 Precautions for safe handling :

Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.

7.2 Conditions for safe storage, including any incompatibilities :

Store in a cool, well-ventilated area.

7.3 Specific end use(s):

No additional information.

8 Exposure controls/personal protection





8.1 Control parameters :

7722-88-5, Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3.

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	**Explosion limit lower:** **Explosion limit upper:**	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	**Vapor pressure at 20°C:**	Not determined or not available.
Odor threshold:	Not determined or not available.	**Vapor density:**	Not determined or not available.
pH-value:	9.5 (aqueous solution)	**Relative density:**	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	**Solubilities:**	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water):**	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature:**	Not determined or not available.
Evaporation rate:	Not determined or not available.	**Decomposition temperature:**	Not determined or not available.

Trade Name: Alconox

Flammability (solid, gaseous):	Not determined or not available.	**Viscosity**:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
Density at 20°C:	Not determined or not available.		

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

11 Toxicological information

11.1 Information on toxicological effects :

Acute Toxicity:

Oral:

: LD50 > 5000 mg/kg oral rat - Product .

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Sodium Alkylbenzene Sulfonate: Causes skin irritation. .

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation .

Tetrasodium Pyrophosphate: Rabbit - Risk of serious damage to eyes .

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.
Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.
Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

PBT: No additional information.

vPvB: No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: ADR, ADN, DOT, IMDG, IATA		None
14.2 UN Proper shipping name: ADR, ADN, DOT, IMDG, IATA		None
14.3 Transport hazard classes: ADR, ADN, DOT, IMDG, IATA	**Class:** **Label:** **LTD. QTY:**	None None None

US DOT
Limited Quantity Exception: None

Bulk:	**Non Bulk:**
RQ (if applicable): None	**RQ (if applicable):** None
Proper shipping Name: None	**Proper shipping Name:** None
Hazard Class: None	**Hazard Class:** None
Packing Group: None	**Packing Group:** None
Marine Pollutant (if applicable): No additional information.	**Marine Pollutant (if applicable):** No additional information.

Trade Name: Alconox

	Comments: None	**Comments:** None
14.4	**Packing group:** ADR, ADN, DOT, IMDG, IATA	None
14.5	**Environmental hazards** :	None
14.6	**Special precautions for user:**	None
	Danger code (Kemler):	None
	EMS number:	None
	Segregation groups:	None
14.7	**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:** Not applicable.	
14.8	**Transport/Additional information:**	
	Transport category:	None
	Tunnel restriction code:	None
	UN "Model Regulation":	None

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.

North American

SARA

Section 313 (specific toxic chemical listings): None of the ingredients are listed.
Section 302 (extremely hazardous substances): None of the ingredients are listed.

CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable

Spill Quantity: None of the ingredients are listed.

TSCA (Toxic Substances Control Act):

Inventory: All ingredients are listed.
Rules and Orders: Not applicable.

Proposition 65 (California):

Chemicals known to cause cancer: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.

Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Germany MAK: Not classified.

Asia Pacific

Australia

Australian Inventory of Chemical Substances (AICS): All ingredients are listed.

China

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed.

Japan

Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed.

Korea

Existing Chemicals List (ECL): All ingredients are listed.

New Zealand

New Zealand Inventory of Chemicals (NZOIC): All ingredients are listed.

Philippines

Philippine Inventory of Chemicals and Chemical Substances (PICCS): All ingredients are listed.

Taiwan

Taiwan Chemical Substance Inventory (TSCI): All ingredients are listed.

16 Other information

Abbreviations and Acronyms: None

Summary of Phrases

Hazard statements:

H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

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

NFPA: 1-0-0

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

HMIS: 1-0-0

SAFETY DATA SHEET

1. Identification

Product identifier **CONDUCTIVITY STANDARD 1413 uS/cm**

Other means of identification

Product code 2174

Recommended use professional, scientific and technical activities: other professional, scientific and technical activities

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company name	GFS Chemicals, Inc.	
Address	P.O. Box 245 Powell OH 43065 US	
Telephone	Phone	740-881-5501
	Toll Free	800-858-9682
	Fax	740-881-5989
Website	www.gfschemicals.com	
E-mail	service@gfschemicals.com	
Emergency phone number	Emergency Assistance	Chemtrec 800-424-9300

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA hazard(s) Not classified.

No hazards resulting from the material as supplied.

Label elements

Hazard symbol No symbol.

Signal word Not available.

Hazard statement Not available.

Precautionary statement

Prevention Not available.

Response Not available.

Storage Not available.

Disposal Not available.

Hazard(s) not otherwise classified (HNOC) Not classified.

3. Composition/information on ingredients

Mixtures

Non-hazardous components

Chemical name	CAS number	%
WATER	7732-18-5	>99.9%
POTASSIUM CHLORIDE	7447-40-7	<0.1%

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation Unlikely route of exposure as the product does not contain volatile substances.

Skin contact Rinse with water.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Drink water as a precaution. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed	Not available.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.

5. Fire-fighting measures

Suitable extinguishing media	Water. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2). Use extinguishing agent suitable for type of surrounding fire.
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	Not applicable.
Special protective equipment and precautions for firefighters	Wear suitable protective equipment.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Not available.
Methods and materials for containment and cleaning up	This product is miscible in water. Stop the flow of material, if this is without risk. Large Spills: Dike the spilled material, where this is possible. Flush into sewer with plenty of water. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills in original containers for re-use. For waste disposal, see section 13 of the MSDS.
Environmental precautions	Prevent further leakage or spillage if safe to do so. Do not contaminate water.

7. Handling and storage

Precautions for safe handling	Avoid release to the environment.
Conditions for safe storage, including any incompatibilities	Keep containers tightly closed.

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	General ventilation normally adequate.
Individual protection measures, such as personal protective equipment	
Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Not normally needed.
Other	Normal work clothing (long sleeved shirts and long pants) is recommended.
Respiratory protection	No personal respiratory protective equipment normally required.
Thermal hazards	Not available.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance	Clear.
Physical state	Liquid.
Form	Aqueous solution.
Color	Colorless.
Odor	Odorless.

Odor threshold	Not available.
pH	6 - 8
Melting point/freezing point	32 °F (0 °C) estimated
Initial boiling point and boiling range	> 212 °F (> 100 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	Miscible.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	1.00 g/cm3 estimated
Percent volatile	> 99.9 %
Specific gravity	1.00 estimated

10. Stability and reactivity

Reactivity	Not available.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	None under normal conditions.
Incompatible materials	None known.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Based on available data, the classification criteria are not met.
Inhalation	Due to lack of data the classification is not possible.
Skin contact	Due to lack of data the classification is not possible.
Eye contact	Due to lack of data the classification is not possible.
Symptoms related to the physical, chemical and toxicological characteristics	Not available.

Information on toxicological effects

Acute toxicity

Product	Species	Test Results
CONDUCTIVITY STANDARD 1413 uS/cm (CAS Mixture)		
Acute		
Oral		
LD50	Guinea pig	99999 mg/kg

Product	Species	Test Results
	Mouse	99999 mg/kg
	Rat	99999 mg/kg
Other		
LD50	Mouse	55714 mg/kg
	Rat	39000 mg/kg, estimated

Components	Species	Test Results
POTASSIUM CHLORIDE (CAS 7447-40-7)		
Acute		
Oral		
LD50	Guinea pig	2500 mg/kg
	Mouse	383 mg/kg
	Rat	2600 mg/kg
Other		
LD50	Mouse	117 mg/kg
	Rat	39 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation Due to lack of data the classification is not possible.

Serious eye damage/eye irritation May irritate eyes. Due to lack of data the classification is not possible.

Respiratory sensitization Due to lack of data the classification is not possible.

Skin sensitization Due to lack of data the classification is not possible.

Germ cell mutagenicity Due to lack of data the classification is not possible.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

Reproductive toxicity Due to lack of data the classification is not possible.

Specific target organ toxicity - single exposure Due to lack of data the classification is not possible.

Specific target organ toxicity - repeated exposure Due to lack of data the classification is not possible.

Aspiration hazard Due to lack of data the classification is not possible.

Further information This product has no known adverse effect on human health.

12. Ecological information

Ecotoxicity Contains a substance which causes risk of hazardous effects to the environment.

Product		Species	Test Results
CONDUCTIVITY STANDARD 1413 uS/cm (CAS Mixture)			
Crustacea	EC50	Daphnia	99999 mg/l, 48 hours
	LC50	Daphnia	99999 mg/l, 6 days
Fish	LC50	Fish	99999 mg/l, 96 hours

Components		Species	Test Results
POTASSIUM CHLORIDE (CAS 7447-40-7)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	83 mg/l, 48 hours
Fish	LC50	Western mosquitofish (Gambusia affinis)	435 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential Not available.

Mobility in soil Not available.

Other adverse effects Not available.

13. Disposal considerations

Disposal instructions Wash to drains with lots of water. Dispose in accordance with all applicable regulations.

Local disposal regulations	Not available.
Hazardous waste code	Not regulated.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as a dangerous good.

IMDG

Not regulated as a dangerous good.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	No information available.

15. Regulatory information

US federal regulations

CERCLA/SARA Hazardous Substances - Not applicable.

All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not on regulatory list.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
SARA 302 Extremely hazardous substance	No
SARA 311/312 Hazardous chemical	No

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Not listed.

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Not regulated.

DEA Exempt Chemical Mixtures Code Number

Not regulated.

Food and Drug Administration (FDA)	Not regulated.
US state regulations	California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Not regulated.

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

16. Other information, including date of preparation or last revision

Issue date October-04-2013

Version # 01

Further information Not available.

Disclaimer The information in the sheet was written based on the best knowledge and experience currently available. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Information Product and Company Identification: Product Codes

ISO9001:2000 Certified

Material Safety Data Sheet
Light's Solution and ORP Standards, 400 – 475 mV

Section 1 - Chemical Product and Company Identification

MSDS Name:
Light's Solution and ORP Standard, 400 - 475 mV
Catalog Numbers:
LC16140, LC18015, LC18020
Synonyms:
Redox Buffers, 400 – 475 mV
Company Identification:
LabChem, Inc.
200 William Pitt Way
Pittsburgh, PA 15238
Company Phone Number:
(412) 826-5230
Emergency Phone Number:
(800) 424-9300
CHEMTREC Phone Number:
(800) 424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name:	Percent
7783-83-7	Ferric ammonium sulfate, dodecahydrate	<10
7783-85-9	Ferrous ammonium sulfate, hexahydrate	<10
7664-93-9	Sulfuric acid	1.5
7732-18-5	Water	Balance

Section 3 - Hazards Identification

Emergency Overview

Appearance*: Yellow solution*

Caution! May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May cause liver damage. May cause cardiac disturbances. Air and light sensitive.

Target Organs: *Eyes, skin, respiratory tract, teeth, liver, cardiovascular system.*

Potential Health Effects

Eye:
May cause moderate eye irritation. May cause chemical conjunctivitis.
Skin:
May cause moderate skin irritation. May be harmful if absorbed through the skin.
Ingestion:
May cause gastrointestinal irritation with nausea, vomiting, and diarrhea. May cause liver damage. May cause cardiac disturbances, cardiovascular abnormalities, and cerebral swelling.

Inhalation:
May cause respiratory tract irritation. Can produce delayed pulmonary edema.

Chronic:
Chronic exposure may cause liver damage. Prolonged or repeated skin contact may cause dermatitis. Chronic exposure to sulfuric acid mists may cause chronic tracheobronchitis, erosion and discoloration of teeth. May cause conjunctivitis and lacrimation. Sulfuric acid mists are carcinogenic to humans.

Section 4 - First Aid Measures

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids until no evidence of chemical remains. Get medical aid at once. Cover burns with loose sterile non-medicated bandages.

Skin:
Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Remove contaminated clothing and shoes. Cover burns with a dry sterile bandage (secure, not tight).

Ingestion:
Do NOT induce vomiting. Get medical aid at once. Give conscious victim large quantities of water to dilute acid. Give oxygen if respiration is depressed.

Inhalation:
Give artificial respiration if necessary. Get medical aid. Keep victim warm, at rest. Move victim to fresh air.

Notes to Physician:
The use of Deferoxamine as a chelating agent should be determined only by qualified medical personnel. Monitor arterial blood gases, chest x-ray, and pulmonary function tests. Treat dermal irritation or burns with standard topical therapy. Effects may be delayed. Do not use sodium bicarbonate in an attempt to neutralize the acid.

Section 5 - Fire Fighting Measures

General Information:
Negligible fire and explosion hazard when exposed to heat or flame. Move container if possible, cool with fog or spray. Do not scatter contents with excess water. Contact with metals may evolve flammable hydrogen gas. Combustion may produce toxic vapors.

Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, or alcohol-resistant foam.

Autoignition Temperature:
No information found.

Flash Point:
No information found.

NFPA Rating:
CAS# 7783-83-7: H-1, F-0, R-0.
CAS# 7783-85-9: H-2, F-0, R-0.
CAS# 7664-93-9: H-3, F-0, R-2.
CAS# 7732-18-5: Not published.

Explosion Limits:
Lower: N/A Upper: N/A

Section 6 - Accidental Release Measures

General Information:
Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spills with absorbent (vermiculite, sand, fuller's earth) and place in plastic bags for later disposal.

Section 7 - Handling and Storage

Handling:
Wash thoroughly after handling. Avoid contact with skin, eyes, and clothing. Keep tightly closed. Avoid ingestion or inhalation.

Storage:
Store capped at room temperature, protected from light and air. Do not store near combustible materials.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:
Facilities using this material should be equipped with an eyewash facility and safety shower. Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. Use a corrosion-resistant ventilation system.

Exposure Limits:

Chemical Name	ACGIH	NIOSH	OSHA
Ferric ammonium sulfate dodecahydrate	1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble))	1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble))	none listed
Ferrous ammonium sulfate hexahydrate	1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble))	1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble))	none listed
Sulfuric acid	0.2 mg/m3 TWA (thoracic fraction)	1 mg/m3 TWA 15 mg/m3 IDLH	1 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs:
Sulfuric acid: 1 mg/m3 TWA
No OSHA Vacated PELs are listed for the other components.

Personal Protective Equipment

Eyes:
Do not wear contact lenses when working with chemicals. An eye wash fountain should be available in the immediate work area. Wear splash-proof safety goggles.

Skin:
Wear acid protective clothing and gloves.

Clothing:
Wear acid protective clothing and gloves.

Respirators:
Use the following when exposure limits are exceeded: Sulfuric acid-- 50 mg/M3 - gas mask with acid gas canister and high efficiency particulate filter. Self contained breathing apparatus with full facepiece. 100 mg/M3 - Type C supplied-air respirator with full facepiece, helmet or hood operated in continuous-flow mode.

Section 9 - Physical and Chemical Properties

Physical State:	Clear liquid
Color:	Dull yellow
Odor:	Very slight sulfurous odor
pH:	Acidic
Vapor Pressure:	No information found.
Vapor Density:	No information found.
Evaporation Rate:	>1 (ether=1)
Viscosity:	No information found.
Boiling Point:	> 100°C (> 212.00°F)
Freezing/Melting Point:	< 0°C (< 32.00°F)
Decomposition Temperature:	No information found.
Solubility in water:	Soluble.
Specific Gravity/Density:	No information found.
Molecular Formula:	No information found.
Molecular Weight:	No information found.

Section 10 - Stability and Reactivity

Chemical Stability:
Stable in closed containers under normal temperatures and pressures.

Conditions to Avoid:
Incompatible materials, light exposure to air, excess heat.

Incompatibilities with Other Materials:
Metals, strong oxidizing agents, alkalies, permanganates, reducing agents, oxidizing agents, acrylonitrile, chlorates, finely powdered metals, nitrate, perchlorates, aniline, carbides, epichlorohydrin, fulminates, picrates, organic materials, flammable liquids.

Hazardous Decomposition Products:
Oxides of nitrogen, oxides of sulfur, ammonia.

Hazardous Polymerization:
Has not been reported

Section 11 - Toxicological Information

RTECS:
CAS# 7783-83-7: WS5900000.

CAS# 7783-85-9: BR6500000.
CAS# 7664-93-9: WS5600000.

LD50/LC50:

CAS# 7783-83-7: Not available.
CAS# 7783-85-9:
Oral, rat: LD50 = 3250 mg/kg.
CAS# 7664-93-9:
Draize test, rabbit, eye: 250ug severe,
Inhalation, mouse: LC50 =320 mg/m3/2H
Inhalation, rat: LC50 =510 mg/m3/2H
Oral, rat: LD50 = 2140 mg/kg.
CAS# 7732-18-5- Not available.

Carcinogenicity:

CAS# 7732-18-5: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.
CAS# 7783-85-9: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.
CAS# 7664-93-9
ACGIH: A2 - Suspected Human Carcinogen (contained in strong inorganic acid mists)
California: Carcinogen, initial date 3/14/03 (listed as Strong inorganic acid mists containing sulfuric acid).
NIOSH: Not listed.
NTP: Known carcinogen (listed as Strong inorganic acid mists containing sulfuric acid).
OSHA: Select carcinogen
IARC: Group 1 carcinogen

Epidemiology:

Workers exposed to industrial sulfuric acid mist showed a statistical increase in laryngeal cancer. This suggests a possible relationship between carcinogenesis and inhalation of sulfuric acid mist.

Teratogenicity:

Sulfuric acid was not teratogenic in mice and rabbits, but was slightly embryotoxic in rabbits (a minor, rare skeletal variation). The animals were exposed to 5 and 20 mg/m3 for 7 hr/day throughout pregnancy. Slight maternal toxicity was present at the highest dose in both species.

Reproductive:

No information found.

Mutagenicity:

There are no mutagenicity studies specifically of sulfuric acid. However, there are established effects of reduced pH in mutagenicity testing, as would be caused by sulfuric acid. These effects are an artifact of low pH and are not necessarily due to biological effects of sulfuric acid.

Neurotoxicity:

No information found.

Section 12 - Ecological Information

Ecotoxicity:

Fish: Bluegill/Sunfish: 49 mg/L; 48 Hr; TLm (tap water @ 20 C)
Fish: Bluegill/Sunfish: 24.5 ppm; 48 Hr; TLm (fresh water)

Material Safety Data Sheet
Light's Solution and ORP Standards, 400 – 475 mV

Section 13 - Disposal Considerations

Dispose of in accordance with Federal, State, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: Corrosive liquid, acidic, inorganic, nos. (Sulfuric acid)
Hazard Class: 8
UN Number: UN3264
Packing Group: PG II

Section 15 - Regulatory Information

US Federal

TSCA:

CAS# 7783-83-7 is not listed on the TSCA inventory. It is for research and development use only.
CAS# 7783-85-9 is not on the TSCA Inventory. However, its anhydrous form is on the inventory, and so this hydrate is exempt from TSCA Inventory requirements (40CFR270.3(u)(2)).
CAS# 7664-93-9 is listed on the TSCA Inventory.
CAS# 7732-18-5 is listed on the TSCA Inventory.

SARA Reportable Quantities (RQ):

CAS# 7664-93-9: final RQ = 1000 pounds (454 kg)

CERCLA/SARA Section 313:

This material contains Sulfuric acid (CAS# 7664-93-9, 1.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

OSHA - Highly Hazardous:

None of the components are on this list.

US State

State Right to Know:

CAS# 7783-83-7 can be found on the following state Right-to-Know lists: California (listed as Iron salts (soluble), Pennsylvania (listed as Iron salts (soluble), Minnesota (listed as Iron salts (soluble).
CAS# 7783-85-9 can be found on the following state Right-to-Know lists: California (listed as Iron salts (soluble), Pennsylvania (listed as Iron salts (soluble), Minnesota (listed as Iron salts (soluble).
CAS# 7664-93-9 can be found on the following state Right-to-Know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California Regulations:

WARNING: This product contains Sulfuric acid, listed as 'Strong inorganic mists containing sulfuric acid,' a chemical known to the state of California to cause cancer.

European/International Regulations

Canadian DSL/NDSL:

CAS# 7783-83-7 is not listed on Canada's DSL List.
CAS# 7783-85-9 is not listed on Canada's DSL List.

CAS# 7664-93-9 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada Ingredient Disclosure List:

CAS# 7783-83-7 (listed as Iron salts (soluble)) is listed on Canada's Ingredient Disclosure List.
CAS# 7783-85-9 (listed as Iron salts (soluble)) is listed on Canada's Ingredient Disclosure List.
CAS# 7664-93-9 is listed on Canada's Ingredient Disclosure List.
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

Section 16 - Other Information

MSDS Creation Date: July 28, 2006
Revision Date: August 20, 2008

Information in this MSDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc. assumes no liability resulting from the use of this MSDS. The user must determine suitability of this information for his application.

SAFETY DATA SHEET

1. IDENTIFICATION

Product identifier
Product Name StablCal® Standard, 10 NTU

Other means of identification
Product Code(s) 2659942

Safety data sheet number M01360

Recommended use of the chemical and restrictions on use
Recommended Use Laboratory Use. Standard solution.
Uses advised against None.
Restrictions on use None.

Details of the supplier of the safety data sheet

Manufacturer Address
Hach Company
P.O.Box 389 Loveland, CO 80539 USA
(970) 669-3050

Emergency telephone number
(303) 623-5716 - 24 Hour Service (515)232-2533 - 8am - 4pm CST

2. HAZARDS IDENTIFICATION

Classification

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

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)
Not applicable

Label elements

Signal word - Danger



Hazard statements
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction

Precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P284 - Wear respiratory protection
P272 - Contaminated work clothing should not be allowed out of the workplace
P280 - Wear protective gloves
P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P363 - Wash contaminated clothing before reuse
P501 - Dispose of contents/ container to an approved waste disposal plant

Other Information
Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance
Not applicable

Mixture

Chemical Family Mixture.

Percent ranges are used where confidential product information is applicable.

Chemical Name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	5 - 10%	-
Sodium sulfate	7757-82-6	0.1 - 1%	-
Formaldehyde	50-00-0	<0.1%	-
Ammonium sulfate	7783-20-2	<0.1%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Eye contact IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If symptoms persist, call a physician.

Skin contact IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. If symptoms persist, call a physician.

Inhalation IF INHALED: Remove person to fresh air and keep comfortable for breathing. If symptoms persist, call a physician.

Ingestion IF SWALLOWED: Rinse Mouth. If symptoms persist, call a physician.

Self-protection of the first aider Use personal protective equipment as required. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Most important symptoms and effects, both acute and delayed

Symptoms See Section 11: TOXICOLOGICAL INFORMATION.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media No information available.

Flammable properties
During a fire, this product decomposes to form toxic gases.

Specific hazards arising from the chemical
May react violently with. Strong acids. Strong oxidizers. Thermal decomposition can lead to release of irritating and toxic gases and vapors. In the event of fire and/or explosion do not breathe fumes. May cause sensitization in susceptible persons.

Hazardous combustion products This material will not burn.

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

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

EC Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special

Instructions for disposal assistance.

WHMIS Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Personal precautions, protective equipment and emergency procedures

Personal precautions Evacuate personnel to safe areas. Do not touch or walk through spilled material. Ventilate affected area. Use personal protective equipment as required.

For emergency responders Use personal protection recommended in Section 8.

Environmental precautions

Environmental precautions Avoid release to the environment. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up Neutralize spill if necessary. Soak up with inert absorbent material. Take up mechanically, placing in appropriate containers for disposal. Clean contaminated surface thoroughly. Dispose of in accordance with local, state and federal regulations or laws.

Emergency Response Guide Number Not applicable

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Do not breathe dust/fume/gas/mist/vapors/spray.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep out of the reach of children. Keep containers tightly closed in a cool, well-ventilated place.

Flammability class Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Formaldehyde <0.1%	Ceiling: 0.3 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Chemical Name	Alberta OEL	British Columbia OEL	Manitoba OEL	New Brunswick OEL	New Foundland & Labrador OEL
Formaldehyde <0.1%	Ceiling: 1 ppm Ceiling: 1.3 mg/m^3 TWA: 0.75 ppm	TWA: 0.3 ppm Ceiling: 1 ppm SKN+	Ceiling: 0.3 ppm	TWA: 0.5 ppm STEL: 1.5 ppm	RSP+ Ceiling: 0.3 ppm SKN+

	TWA: 0.9 mg/m³				

Chemical Name	Northwest Territories OEL	Nova Scotia OEL	Nunavut OEL	Ontario TWA	Prince Edward Island OEL
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 5 - 10%	NDF	NDF	NDF	STEL: 0.35 ppm STEL: 2 mg/m³	NDF
Formaldehyde <0.1%	Ceiling: 0.3 ppm SKN+	RSP+ Ceiling: 0.3 ppm SKN+	Ceiling: 0.3 ppm	STEL: 1 ppm Ceiling: 1.5 ppm	Ceiling: 0.3 ppm

Chemical Name	Quebec OEL	Saskatchewan OEL	Yukon OEL
Formaldehyde <0.1%	Ceiling: 2 ppm Ceiling: 3 mg/m³	Ceiling: 0.3 ppm SKN+	Ceiling: 2 ppm Ceiling: 3 mg/m³

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Legend See section 16 for terms and abbreviations

Appropriate engineering controls

Engineering Controls Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection Wear tight sealing safety goggles and/or face protection shield.

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Take off all contaminated clothing and wash it before reuse. Wash hands thoroughly after handling. Regular cleaning of equipment, work area and clothing is recommended.

Environmental exposure controls
Do not allow into any sewer, on the ground or into any body of water.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state Liquid

Gas Under Pressure Not classified according to GHS criteria

Appearance Turbid solution
aqueous solution

Color Milky white

Odor Odorless

Odor threshold No data available

Property	Values	Remarks • Method
Molecular weight	No data available	

pH	8.14	
Melting point/freezing point	0 °C / 32 °F	
Boiling point / boiling range	100 °C / 212 °F	
Evaporation rate	1 (water = 1) Estimation based on theoretical calculation	Estimation based on theoretical calculation
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	Estimation based on theoretical calculation
Vapor density (air = 1)	0.62	
Specific gravity (water = 1 / air = 1)	1.02	
Partition Coefficient (n-octanol/water)	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
Acid	Soluble	> 1000 mg/L	25 °C / 77 °F

Other Information

Metal Corrosivity	Not classified as corrosive to metal according to GHS criteria
Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available
Volatile Organic Compounds (VOC) Content	No information available.
Bulk density	Not applicable
Explosive properties	Not classified according to GHS criteria.
Explosion data	No data available
Upper explosion limit	No data available
Lower explosion limit	No data available

Flammable properties	During a fire, this product decomposes to form toxic gases.
Flammability Limit in Air	
Upper flammability limit:	No data available
Lower flammability limit:	No data available
Flash point	No data available
Oxidizing properties	Not classified according to GHS criteria.
Reactivity propeties	Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria.

10. STABILITY AND REACTIVITY

Reactivity propeties
Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria

Chemical stability
Stable under recommended storage conditions.

Special dangers of the product
No information available

Possibility of Hazardous Reactions
No information available.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid
Poor Ventilation. Extremes of temperature and direct sunlight.

Incompatible materials
Oxidizers. Acids.

Hazardous Decomposition Products
Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

Explosive properties
Not classified according to GHS criteria.

Upper explosion limit No data available

Lower explosion limit No data available

Autoignition temperature
No data available

Sensitivity to Static Discharge
None reported

Sensitivity to Mechanical Impact
None reported

11. TOXICOLOGICAL INFORMATION

NIOSH (RTECS) Number None reported

Information on Likely Routes of Exposure

Product Information	Respiratory sensitizer. Skin sensitizer.
Inhalation	May cause sensitization by inhalation.
Eye contact	No known effect based on information supplied.
Skin contact	May cause sensitization by skin contact.
Ingestion	No known effect based on information supplied.
Aggravated Medical Conditions	Respiratory disorders. Skin disorders.
Toxicologically synergistic products	None known.
Toxicokinetics, metabolism and distribution	See ingredients information below.

Chemical Name	Toxicokinetics, metabolism and distribution
Formaldehyde (<0.1%) CAS#: 50-00-0	Readily Absorbed via the respiratory and gastrointestinal routes. Absorbed formaldehyde can be oxidized to formate and carbon dioxide. Half-life of formaldehyde is 1 min in rat plasma.

Product Acute Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	7,175.00 mg/kg

Ingredient Acute Toxicity Data

Oral Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Rat LD_{50}	569 mg/kg	None reported	None reported	Vendor SDS
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD_{50}	100 mg/kg	None reported	None reported	No information available
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Rat LD_{50}	2840 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse LD_{50}	5989 mg/kg	None reported	None reported	IUCLID (The International Uniform Chemical Information Database)

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD_{Lo}	70 mg/kg	None reported	**Kidney, Ureter, or Bladder** Other changes **Liver**	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Man TD_{Lo}	1500 mg/kg	None reported	**Gastrointestinal** Gas	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TD_{Lo}	643 mg/kg	None reported	**Lungs, Thorax, or Respiration** Respiratory obstruction	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Domestic mammal - Not specified LD_{Lo}	3500 mg/kg	None reported	**Lungs, Thorax, or Respiration** Respiratory stimulation	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD_{50}	270 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC_{50}	250 mg/L	4 hours	None reported	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Skin Corrosion/Irritation Data
No data available.

Ingredient Skin Corrosion/Irritation Data

Chemical Name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Organization for Economic Co-operation and Development (OECD) - Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)

Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Open Irritation Test	Guinea pig	100 mg	5 days	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	2 mg	24 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)

Product Serious Eye Damage/Eye Irritation Data
No data available.

Ingredient Eye Damage/Eye Irritation Data

Chemical Name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Standard Draize Test	Rabbit	100 mg	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	0.750 mg	24 hours	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)

Sensitization Information

Product Sensitization Data

Skin Sensitization Exposure Route No data available.

Respiratory Sensitization Exposure Route No data available.

Ingredient Sensitization Data

Skin Sensitization Exposure Route .

Chemical Name	Test method	Species	Results	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%)	Patch test	Human	Confirmed to be a skin sensitizer	ERMA (New Zealands Environmental Risk Management Authority)

CAS#: 50-00-0				

Respiratory Sensitization Exposure Route .

Chemical Name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD (Concise International Chemical Assessment Documents)

Chronic Toxicity Information

Product Repeat Dose Toxicity Data

Oral Exposure Route No data available.

Dermal Exposure Route No data available.

Inhalation (Dust/Mist) Exposure Route No data available.

Inhalation (Vapor) Exposure Route No data available.

Inhalation (Gas) Exposure Route No data available.

Ingredient Repeat Dose Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Inhalation (Vapor) Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC_{Lo}	0.017 mg/L	0.5 days	**Eye** Lacrimation **Lungs, Thorax, or Respiration** Other changes	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC_{Lo}	2 mg/L	40 minutes	**Lungs, Thorax, or Respiration** Other changes Respiratory depression	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Chemical Name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A2	Group 1	Known	X
Ammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)	X - Present

Product Carcinogenicity Data No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Carcinogenicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	**Olfaction** Tumors	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Germ Cell Mutagenicity*invitro*Data
No data available.

Ingredient Germ Cell Mutagenicity*invitro*Data

Chemical Name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Cell Strain**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Morphological transformation	Hamster kidney	10 mg/L	None reported	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Germ Cell Mutagenicity*invivo*Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	DNA damage	Rat	0.000035 mg/L	8 weeks	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Vapor) Exposure Route

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	2 mg/L	15 minutes	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Reproductive Toxicity Data

Oral Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse TD_{Lo}	14000 mg/kg	4 days	**Effects on Newborn** Other neonatal measures or effects	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	40 mg/L	14 days	**Effects on Embryo or Fetus** Fetotoxicity (except death e.g. stunted fetus)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.001 mg/L	24 weeks	**Effects on Embryo or Fetus** Cytological changes (including somatic cell genetic material)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.0005 mg/L	19 days	**Specific Developmental Abnormalities**Musculoskeletal system	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

12. ECOLOGICAL INFORMATION

Ecotoxicity Based on the classification principles, not classified as hazardous to the environment.

Product Ecological Data

Aquatic toxicity

Fish No data available

Crustacea No data available

Algae No data available

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Ingredient Ecological Data

Aquatic toxicity

Fish

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	96 hours	*Alburnus alburnus*	LC_{50}	> 10000 mg/L	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	None reported	LC_{50}	56 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%)	96 hours	*Morone saxatilis*	LC_{50}	6.7 mg/L	PEEN (Pan European Ecological Network)

CAS#: 50-00-0					
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	96 hours	*Oncorhynchus mykiss*	LC_{50}	36.7 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	*Pimephales promelas*	LC_{50}	7960 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	None reported	LC_{50}	52.5 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	96 hours	None reported	LC_{50}	365 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Crustacea

Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	48 Hours	*Daphnia magna*	EC_{50}	> 36000 mg/L	EPA (United States Environmental Protection Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	48 Hours	*Daphnia magna*	EC_{50}	3150 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%) CAS#: 50-00-0	48 Hours	*Daphnia pulex*	EC_{50}	5.8 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	48 Hours	None reported	LC_{50}	14 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	48 hours	*Daphnia magna*	EC_{50}	29 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	48 hours	None reported	EC_{50}	59 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Algae

Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	72 hours	*Selenastrum capricornutum*	EC_{50}	> 100 mg/L	CEPA (Canadian Environmental Protection Agency)

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Other Information

Canadian Environmental Protection Act (CEPA) - Domestic Substances List (DSL): Environmentally Hazardous Substances Categorizations				
Chemical Name	**Category**	**Persistent**	**Bioaccumulation**	**Inherently Toxic to Aquatic Organisms**
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Inorganics	Yes	No	Yes

Persistence and degradability
None known.

Product Biodegradability Data
If available, see ingredient data below.

Ingredient Biodegradability Data
Test data reported below

Chemical Name	Test method	Biodegradation	Exposure time	Results
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	None reported	70%	28 days	Readily biodegradable
Formaldehyde (<0.1%) CAS#: 50-00-0	None reported	99%	28 days	Readily biodegradable

Bioaccumulation
If available, see ingredient data below.

Product Bioaccumulation Data If available, see ingredient data below.

Ingredient Bioaccumulation Data

Chemical Name	Test method	Exposure time	Species	Bioconcentration factor (BCF)	Results
Formaldehyde (<0.1%) CAS#: 50-00-0	None reported	None reported	None reported	None reported	Does not have the potential to bioaccumulate

Additional information

Product Information

Partition Coefficient (n-octanol/water) Not applicable

Ingredient Information

Chemical Name	Partition Coefficient	Method

	(n-octanol/water)	
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{ow} = -2.13	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{ow} = -3	No information available
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{ow} = 0.35	No information available

Mobility
Mobility in soil: High mobility. If available, see ingredient data below.

Product Information

Soil Organic Carbon-Water Partition Coefficient Not applicable

Ingredient Information

Chemical Name	Soil Organic Carbon-Water Partition Coefficient	Method
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{oc} = 2.68	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{oc} = -1.4	Estimation through KOCWIN v2.00 part of the Estimation Programs Interface (EPI) Suite™
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{oc} = 0.89	No information available

Additional information

Water solubility

Product Information

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Ingredient Information

Chemical Name	Water solubility classification	Water solubility	Water solubility temperature °C	Water solubility temperature °F
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	Completely soluble	667000 mg/L	20 °C	68 °F
Sodium sulfate CAS#: 7757-82-6	Completely soluble	160000 mg/L	20 °C	68 °F
Formaldehyde CAS#: 50-00-0	Completely soluble	> 40000 mg/L	20 °C	68 °F
Ammonium sulfate CAS#: 7783-20-2	Completely soluble	767000 mg/L	25 °C	77 °F

Other adverse effects
Contains a substance with an endocrine-disrupting potential.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Contaminated packaging Dispose of in accordance with federal, state and local regulations.

US EPA Waste Number Not applicable, U122

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT Not regulated
Special Provisions

TDG Not regulated

IATA Not regulated

IMDG Not regulated

Note: No special precautions necessary.

Additional information
There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods.
If the item is not in a reagent set or kit, the classification given above applies.
If the item is part of a reagent set or kit the classification would change to the following:
UN3316 Chemical Kit, Hazard Class 9, Packing Group II or III.
If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories

TSCA	Complies
DSL/NDSL	Complies

TSCA- United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL- Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS	Complies
ENCS	Does not comply
IECSC	Complies
KECL	Complies
PICCS	Complies
TCSI	Complies
AICS	Complies
NZIoC	Does not comply

EINECS/ELINCS- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS- Japan Existing and New Chemical Substances

IECSC- China Inventory of Existing Chemical Substances
KECL- Korean Existing and Evaluated Chemical Substances
PICCS- Philippines Inventory of Chemicals and Chemical Substances
TCSI- Taiwan Chemical Substances Inventory
AICS- Australian Inventory of Chemical Substances
NZIoC- New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Ammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical Name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65
This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Ammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information
EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

NFPA and HMIS Classifications

NFPA	**Health hazards** - 2	**Flammability** - 0	**Instability** - 0	**Physical and Chemical Properties** -
HMIS	**Health hazards** - 2	**Flammability** - 0	**Physical hazards** - 0	**Personal protection** - X - See section 8 for more information

Key or legend to abbreviations and acronyms used in the safety data sheet

NIOSH IDLH	*Immediately Dangerous to Life or Health*
ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
NDF	*no data*

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.
SKN*	Skin designation	SKN+	Skin sensitization
RSP+	Respiratory sensitization	**	Hazard Designation
C	Carcinogen	R	Reproductive toxicant
M	mutagen		

Prepared By Hach Product Compliance Department

Issue Date 25-Jul-2016

Revision Date 24-Oct-2016

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2016

End of Safety Data Sheet

SAFETY DATA SHEET

1. IDENTIFICATION

Product identifier
Product Name StablCal ® Standard, 20 NTU

Other means of identification
Product Code(s) 2660100

Safety data sheet number M03409

Synonyms

Recommended use of the chemical and restrictions on use
Recommended Use Laboratory Use. Standard solution.
Uses advised against None.
Restrictions on use None.

Details of the supplier of the safety data sheet

Manufacturer Address
Hach Company
P.O.Box 389 Loveland, CO 80539 USA
(970) 669-3050

Emergency telephone number
(303) 623-5716 - 24 Hour Service (515)232-2533 - 8am - 4pm CST

2. HAZARDS IDENTIFICATION

Classification

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

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)
Not applicable

Label elements

Signal word - Danger



Hazard statements
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction EUH208 - May produce an allergic reaction

Precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P284 - Wear respiratory protection
P272 - Contaminated work clothing should not be allowed out of the workplace
P280 - Wear protective gloves
P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P363 - Wash contaminated clothing before reuse
P501 - Dispose of contents/ container to an approved waste disposal plant

Other Information
Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance
Not applicable

Mixture

Synonyms .
Chemical Family Mixture.

Percent ranges are used where confidential product information is applicable.

Chemical Name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	5 - 10%	-
Sodium sulfate	7757-82-6	0.1 - 1%	-
Formaldehyde	50-00-0	<0.1%	-
Ammonium sulfate	7783-20-2	<0.01%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice IF IN EYES: Flush eyes for at least 15 minutes. May cause allergic skin reaction. Repeated contact may cause allergic reactions in very susceptible persons.

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

Skin contact For minor skin contact, avoid spreading material on unaffected skin. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Remove and isolate contaminated clothing and shoes. Call a POISON CENTER or doctor if you feel unwell. If skin irritation persists, call a physician. May cause an allergic skin reaction. Consult a physician if necessary.

Inhalation May cause allergic respiratory reaction. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

Ingestion IF SWALLOWED: Rinse Mouth. If symptoms persist, call a physician.

Self-protection of the first aider Use personal protective equipment as required. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Most important symptoms and effects, both acute and delayed

Symptoms See Section 11: TOXICOLOGICAL INFORMATION.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Causes sensitization.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Small Fire Dry chemical or CO2.

Unsuitable extinguishing media No information available.

Flammable properties
During a fire, this product decomposes to form toxic gases.

Specific hazards arising from the chemical
May react violently with. Strong acids. Strong oxidizers. Thermal decomposition can lead to release of irritating and toxic gases and vapors. In the event of fire and/or explosion do not breathe fumes. May cause sensitization in susceptible persons.

Hazardous combustion products This material will not burn.

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

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and

guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

EC Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

WHMIS Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Personal precautions, protective equipment and emergency procedures

Personal precautions Evacuate personnel to safe areas. Do not touch or walk through spilled material. Ventilate affected area. Use personal protective equipment as required.

For emergency responders Use personal protection recommended in Section 8.

Environmental precautions

Environmental precautions Prevent entry into waterways, sewers, basements or confined areas. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up Neutralize spill if necessary. Soak up with inert absorbent material. Take up mechanically, placing in appropriate containers for disposal. Clean contaminated surface thoroughly. Dispose of in accordance with local, state and federal regulations or laws.

Emergency Response Guide Number Not applicable

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Do not breathe dust/fume/gas/mist/vapors/spray.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep out of the reach of children. Keep containers tightly closed in a cool, well-ventilated place.

Flammability class Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Formaldehyde <0.1%	Ceiling: 0.3 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

		STEL: 2 ppm	

Chemical Name	Alberta OEL	British Columbia OEL	Manitoba OEL	New Brunswick OEL	New Foundland & Labrador OEL
Formaldehyde <0.1%	Ceiling: 1 ppm Ceiling: 1.3 mg/m³ TWA: 0.75 ppm TWA: 0.9 mg/m³	TWA: 0.3 ppm Ceiling: 1 ppm SKN+	Ceiling: 0.3 ppm	TWA: 0.5 ppm STEL: 1.5 ppm	RSP+ Ceiling: 0.3 ppm SKN+

Chemical Name	Northwest Territories OEL	Nova Scotia OEL	Nunavut OEL	Ontario TWA	Prince Edward Island OEL
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 5 - 10%	NDF	NDF	NDF	STEL: 0.35 ppm STEL: 2 mg/m³	NDF
Formaldehyde <0.1%	Ceiling: 0.3 ppm SKN+	RSP+ Ceiling: 0.3 ppm SKN+	Ceiling: 0.3 ppm	STEL: 1 ppm Ceiling: 1.5 ppm	Ceiling: 0.3 ppm

Chemical Name	Quebec OEL	Saskatchewan OEL	Yukon OEL
Formaldehyde <0.1%	Ceiling: 2 ppm Ceiling: 3 mg/m³	Ceiling: 0.3 ppm SKN+	Ceiling: 2 ppm Ceiling: 3 mg/m³

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Legend See section 16 for terms and abbreviations

Appropriate engineering controls

Engineering Controls Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection Wear tight sealing safety goggles and/or face protection shield. Avoid contact with eyes. Wear safety glasses with side shields (or goggles).

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

General Hygiene Considerations Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wear suitable gloves and eye/face protection. Wash face, hands and any exposed skin thoroughly after handling. Regular cleaning of equipment, work area and clothing is recommended. Handle in accordance with good industrial hygiene and safety practice. Avoid prolonged or repeated contact with skin. Take off all contaminated clothing and wash it before reuse. Do not eat, drink or smoke when using this product. Keep away from food, drink and animal feeding stuffs.

Environmental exposure controls
Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state Liquid

Gas Under Pressure Not classified according to GHS criteria

Appearance	Turbid solution aqueous solution	**Color**	white
Odor	Odorless	**Odor threshold**	No data available

Property	**Values**	**Remarks • Method**
Molecular weight	No data available	
pH	No data available	
Melting point/freezing point	~ 0 °C / 32 °F	Estimation based on theoretical calculation
Boiling point / boiling range	~ 100 °C / 212 °F	Estimation based on theoretical calculation
Evaporation rate	1 (water = 1) Estimation based on theoretical calculation	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	Estimation based on theoretical calculation
Vapor density (air = 1)	0.62 (air = 1)	
Specific gravity (water = 1 / air = 1)	1.02	
Partition Coefficient (n-octanol/water)	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
None reported	No information available	No data available	No information available

Other Information

Metal Corrosivity	Not classified as corrosive to metal according to GHS criteria
Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available
Volatile Organic Compounds (VOC) Content	No information available.

Bulk density	Not applicable
Explosive properties	Not classified according to GHS criteria.
Explosion data	No data available
Upper explosion limit	No data available
Lower explosion limit	No data available
Flammable properties	During a fire, this product decomposes to form toxic gases.
Flammability Limit in Air	
Upper flammability limit:	No data available
Lower flammability limit:	No data available
Flash point	No data available
Oxidizing properties	Not classified according to GHS criteria.
Reactivity propeties	Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria.

10. STABILITY AND REACTIVITY

Reactivity propeties
Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria

Chemical stability
Stable under recommended storage conditions.

Special dangers of the product
No information available

Possibility of Hazardous Reactions
No information available.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid
Extremes of temperature and direct sunlight. Incompatible materials.

Incompatible materials
Strong oxidizing agents. Strong acids. Strong bases.

Hazardous Decomposition Products
Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

Explosive properties
Not classified according to GHS criteria.

Upper explosion limit No data available

Lower explosion limit No data available

Autoignition temperature
No data available

Sensitivity to Static Discharge
None reported

Sensitivity to Mechanical Impact
None reported

11. TOXICOLOGICAL INFORMATION

NIOSH (RTECS) Number None reported

Information on Likely Routes of Exposure

Product Information	Respiratory sensitizer. Skin sensitizer.
Inhalation	May cause sensitization by inhalation.
Eye contact	No known effect based on information supplied.
Skin contact	May cause sensitization by skin contact.
Ingestion	No known effect based on information supplied.
Aggravated Medical Conditions	Respiratory disorders. Skin disorders.
Toxicologically synergistic products	None known.
Toxicokinetics, metabolism and distribution	See ingredients information below.

Chemical Name	Toxicokinetics, metabolism and distribution
Formaldehyde (<0.1%) CAS#: 50-00-0	Readily Absorbed via the respiratory and gastrointestinal routes. Absorbed formaldehyde can be oxidized to formate and carbon dioxide. Half-life of formaldehyde is 1 min in rat plasma.

Product Acute Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	7,101.00 mg/kg

Ingredient Acute Toxicity Data

Oral Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Mouse LD_{50}	569 mg/kg	None reported	None reported	Vendor SDS NIOSH (National Institute for Occupational Safety and Health)
Formaldehyde	Rat	100 mg/kg	None	None reported	Vendor SDS

(<0.1%) CAS#: 50-00-0	LD_{50}		reported		
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	Rat LD_{50}	2840 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse LD_{50}	5989 mg/kg	None reported	None reported	IUCLID (The International Uniform Chemical Information Database)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD_{Lo}	70 mg/kg	None reported	**Gastrointestinal** Ulcerated stomach **Liver** Other changes **Kidney, Ureter, or Bladder** Other changes	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	Man TD_{Lo}	1500 mg/kg	None reported	**Gastrointestinal** Gas	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TD_{Lo}	643 mg/kg	None reported	**Lungs, Thorax, or Respiration** Respiratory obstruction **Gastrointestinal** Ulcerated stomach Nausea or vomiting	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	Domestic mammal - Not specified LD_{Lo}	3500 mg/kg	None reported	**Lungs, Thorax, or Respiration** Respiratory stimulation	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route If available, see data below

Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD_{50}	270 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC_{50}	250 mg/L	4 hours	None reported	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Skin Corrosion/Irritation Data
No data available.

Ingredient Skin Corrosion/Irritation Data
If available, see data below

Chemical Name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Organization for Economic Co-operation and Development (OECD) - Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Open Irritation Test	Guinea pig	100 mg	5 days	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	2 mg	24 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)

Product Serious Eye Damage/Eye Irritation Data
No data available.

Ingredient Eye Damage/Eye Irritation Data
If available, see data below

Chemical Name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Standard Draize Test	Rabbit	100 mg	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	0.750 mg	24 hours	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)

Sensitization Information

Product Sensitization Data

Skin Sensitization Exposure Route No data available.

Respiratory Sensitization Exposure Route No data available.

Ingredient Sensitization Data

Skin Sensitization Exposure Route If available, see data below.

Chemical Name	Test method	Species	Results	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA (New Zealands Environmental Risk Management Authority)

Respiratory Sensitization Exposure Route If available, see data below.

Chemical Name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD (Concise International Chemical Assessment Documents)

Chronic Toxicity Information

Product Repeat Dose Toxicity Data

Oral Exposure Route No data available.

Dermal Exposure Route No data available.

Inhalation (Dust/Mist) Exposure Route No data available.

Inhalation (Vapor) Exposure Route No data available.

Inhalation (Gas) Exposure Route No data available.

Ingredient Repeat Dose Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route If available, see data below

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC_{Lo}	0.017 mg/L	0.5 days	**Eye** Lacrimation **Lungs, Thorax, or Respiration** Other changes	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**

Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC_{Lo}	2 mg/L	40 minutes	**Lungs, Thorax, or Respiration** Other changes Respiratory depression	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Chemical Name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A2	Group 1	Known	X
Ammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)	X - Present

Product Carcinogenicity Data No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Carcinogenicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	**Olfaction** Tumors	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Germ Cell Mutagenicity*invitro*Data
No data available.

Ingredient Germ Cell Mutagenicity*invitro*Data If available, see data below

Chemical Name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data

1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Cell Strain**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Morphological transformation	Hamster kidney	10 mg/L	None reported	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Germ Cell Mutagenicity*invivo*Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route If available, see data below

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	DNA damage	Rat	0.000035 mg/L	8 weeks	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	2 mg/L	15 minutes	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Reproductive Toxicity Data

Oral Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse TD_{Lo}	14000 mg/kg	4 days	**Effects on Newborn** Other neonatal measures or effects	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	40 mg/L	14 days	**Effects on Embryo or Fetus** Fetotoxicity (except death e.g. stunted fetus)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.001 mg/L	24 weeks	**Effects on Embryo or Fetus** Cytological changes (including somatic cell genetic material)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.0005 mg/L	19 days	**Specific Developmental Abnormalities**Musculoskeletal system	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

12. ECOLOGICAL INFORMATION

Ecotoxicity Based on the classification principles, not classified as hazardous to the environment.

Product Ecological Data

Aquatic toxicity

Fish No data available

Crustacea No data available

Algae No data available

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Ingredient Ecological Data

Aquatic toxicity

Fish If available, see ingredient data below

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	96 hours	*Alburnus alburnus*	LC_{50}	> 10000 mg/L	Vendor SDS
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	None reported	LC_{50}	56 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	*Morone saxatilis*	LC_{50}	6.7 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	96 hours	*Oncorhynchus mykiss*	LC_{50}	36.7 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	*Pimephales promelas*	LC_{50}	7960 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	None reported	LC_{50}	52.5 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	96 hours	None reported	LC_{50}	365 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Crustacea If available, see ingredient data below

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	48 Hours	*Daphnia magna*	EC_{50}	> 36000 mg/L	EPA (United States Environmental Protection Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	48 Hours	*Daphnia magna*	EC_{50}	3150 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%) CAS#: 50-00-0	48 Hours	*Daphnia pulex*	EC_{50}	5.8 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	48 Hours	None reported	LC_{50}	14 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	48 hours	*Daphnia magna*	EC_{50}	29 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	48 hours	None reported	EC_{50}	59 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident

					Insurance)

Algae If available, see ingredient data below

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	72 hours	*Selenastrum capricornutum*	EC_{50}	> 100 mg/L	CEPA (Canadian Environmental Protection Agency)

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Other Information

Canadian Environmental Protection Act (CEPA) - Domestic Substances List (DSL): Environmentally Hazardous Substances Categorizations

Chemical Name	Category	Persistent	Bioaccumulation	Inherently Toxic to Aquatic Organisms
Ammonium sulfate (<0.01%) CAS#: 7783-20-2	Inorganics	Yes	No	Yes

Persistence and degradability
None known.

Product Biodegradability Data
If available, see ingredient data below.

Ingredient Biodegradability Data
Test data reported below

Chemical Name	Test method	Biodegradation	Exposure time	Results
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	None reported	70%	28 days	Readily biodegradable

Bioaccumulation
If available, see ingredient data below.

Product Bioaccumulation Data If available, see ingredient data below.

Ingredient Bioaccumulation Data No data available

Chemical Name	Test method	Exposure time	Species	Bioconcentration factor (BCF)	Results
Formaldehyde	None reported	None	None reported	None reported	Does not

(<0.1%) CAS#: 50-00-0		reported			have the potential to bioaccumulate

Additional information

Product Information

Partition Coefficient (n-octanol/water) Not applicable

Ingredient Information

Chemical Name	Partition Coefficient (n-octanol/water)	Method
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{ow} = .?	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{ow} = -3	No information available
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{ow} = 0.35	No information available

Mobility
Mobility in soil: High mobility. If available, see ingredient data below.

Product Information

Soil Organic Carbon-Water Partition Coefficient Not applicable

Ingredient Information

Chemical Name	Soil Organic Carbon-Water Partition Coefficient	Method
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{oc} = .?	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{oc} = -1.4	Estimation through KOCWIN v2.00 part of the Estimation Programs Interface (EPI) Suite™
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{oc} = 0.89	No information available

Additional information

Water solubility

Product Information

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Ingredient Information

Chemical Name	Water solubility classification	Water solubility	Water solubility temperature °C	Water solubility temperature °F
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	Completely soluble	667000 mg/L	20 °C	68 °F

CAS#: 100-97-0				
Sodium sulfate CAS#: 7757-82-6	Completely soluble	160000 mg/L	20 °C	68 °F
Formaldehyde CAS#: 50-00-0	Completely soluble	> 40000 mg/L	20 °C	68 °F
Ammonium sulfate CAS#: 7783-20-2	Completely soluble	767000 mg/L	25 °C	77 °F

Other adverse effects
Contains a substance with an endocrine-disrupting potential.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Contaminated packaging Dispose of in accordance with federal, state and local regulations.

US EPA Waste Number Not applicable, U122

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT Not regulated
Special Provisions

TDG Not regulated

IATA Not regulated

IMDG Not regulated

Note: No special precautions necessary.

Additional information
There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods.
If the item is not in a reagent set or kit, the classification given above applies.
If the item is part of a reagent set or kit the classification would change to the following:
UN3316 Chemical Kit, Hazard Class 9, Packing Group II or III.
If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories
TSCA Complies
DSL/NDSL Complies

TSCA- United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL- Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS	Complies
ENCS	Complies
IECSC	Complies
KECL	Complies
PICCS	Complies
TCSI	Complies
AICS	Complies
NZIoC	Complies

EINECS/ELINCS- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS- Japan Existing and New Chemical Substances
IECSC- China Inventory of Existing Chemical Substances
KECL- Korean Existing and Evaluated Chemical Substances
PICCS- Philippines Inventory of Chemicals and Chemical Substances
TCSI- Taiwan Chemical Substances Inventory
AICS- Australian Inventory of Chemical Substances
NZIoC- New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Ammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical Name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Ammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Additional information

Global Automotive Declarable Substance List (GADSL)

Chemical Name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thersholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %
Formaldehyde 50-00-0	Declarable Substance (FI) Prohibited Substance (LR) Declarable Substance (LR)	0.1 % 0.0 %

Special Comments
None

NFPA and HMIS Classifications

NFPA	**Health hazards** - 2	**Flammability** - 0	**Instability** - 0	**Physical and Chemical Properties** -
HMIS	**Health hazards** - 2	**Flammability** - 0	**Physical Hazards** - 0	**Personal protection** - X - See section 8 for more information

Key or legend to abbreviations and acronyms used in the safety data sheet

NIOSH IDLH	*Immediately Dangerous to Life or Health*
ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
NDF	*no data*

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.
SKN*	Skin designation	SKN+	Skin sensitization
RSP+	Respiratory sensitization	**	Hazard Designation
C	Carcinogen	R	Reproductive toxicant
M	mutagen		

Prepared By	Hach Product Compliance Department
Issue Date	06-Jul-2016
Revision Date	09-Feb-2017
Revision Note	None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2016

End of Safety Data Sheet

SAFETY DATA SHEET

1. IDENTIFICATION

Product identifier
Product Name StablCal® Standard, 100 NTU

Other means of identification
Product Code(s) 2660242

Safety data sheet number M01360

Recommended use of the chemical and restrictions on use
Recommended Use Laboratory Use. Standard solution.
Uses advised against None.
Restrictions on use None.

Details of the supplier of the safety data sheet

Manufacturer Address
Hach Company
P.O.Box 389 Loveland, CO 80539 USA
(970) 669-3050

Emergency telephone number
(303) 623-5716 - 24 Hour Service (515)232-2533 - 8am - 4pm CST

2. HAZARDS IDENTIFICATION

Classification

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

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)
Not applicable

Label elements

Signal word - Danger



Hazard statements
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction

Precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P284 - Wear respiratory protection
P272 - Contaminated work clothing should not be allowed out of the workplace
P280 - Wear protective gloves
P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P363 - Wash contaminated clothing before reuse
P501 - Dispose of contents/ container to an approved waste disposal plant

Other Information
Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance
Not applicable

Mixture

Chemical Family Mixture.

Percent ranges are used where confidential product information is applicable.

Chemical Name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	5 - 10%	-
Sodium sulfate	7757-82-6	0.1 - 1%	-
Formaldehyde	50-00-0	<0.1%	-
Ammonium sulfate	7783-20-2	<0.1%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Eye contact IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If symptoms persist, call a physician.

Skin contact IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. If symptoms persist, call a physician.

Inhalation IF INHALED: Remove person to fresh air and keep comfortable for breathing. If symptoms persist, call a physician.

Ingestion IF SWALLOWED: Rinse Mouth. If symptoms persist, call a physician.

Self-protection of the first aider Use personal protective equipment as required. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Most important symptoms and effects, both acute and delayed

Symptoms See Section 11: TOXICOLOGICAL INFORMATION.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media No information available.

Flammable properties
During a fire, this product decomposes to form toxic gases.

Specific hazards arising from the chemical
May react violently with. Strong acids. Strong oxidizers. Thermal decomposition can lead to release of irritating and toxic gases and vapors. In the event of fire and/or explosion do not breathe fumes. May cause sensitization in susceptible persons.

Hazardous combustion products This material will not burn.

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

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

EC Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special

Instructions for disposal assistance.

WHMIS Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Personal precautions, protective equipment and emergency procedures

Personal precautions Evacuate personnel to safe areas. Do not touch or walk through spilled material. Ventilate affected area. Use personal protective equipment as required.

For emergency responders Use personal protection recommended in Section 8.

Environmental precautions

Environmental precautions Avoid release to the environment. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up Neutralize spill if necessary. Soak up with inert absorbent material. Take up mechanically, placing in appropriate containers for disposal. Clean contaminated surface thoroughly. Dispose of in accordance with local, state and federal regulations or laws.

Emergency Response Guide Number Not applicable

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Do not breathe dust/fume/gas/mist/vapors/spray.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep out of the reach of children. Keep containers tightly closed in a cool, well-ventilated place.

Flammability class Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Formaldehyde <0.1%	Ceiling: 0.3 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Chemical Name	Alberta OEL	British Columbia OEL	Manitoba OEL	New Brunswick OEL	New Foundland & Labrador OEL
Formaldehyde <0.1%	Ceiling: 1 ppm Ceiling: 1.3 mg/m^3 TWA: 0.75 ppm	TWA: 0.3 ppm Ceiling: 1 ppm SKN+	Ceiling: 0.3 ppm	TWA: 0.5 ppm STEL: 1.5 ppm	RSP+ Ceiling: 0.3 ppm SKN+

	TWA: 0.9 mg/m³				

Chemical Name	Northwest Territories OEL	Nova Scotia OEL	Nunavut OEL	Ontario TWA	Prince Edward Island OEL
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 5 - 10%	NDF	NDF	NDF	STEL: 0.35 ppm STEL: 2 mg/m³	NDF
Formaldehyde <0.1%	Ceiling: 0.3 ppm SKN+	RSP+ Ceiling: 0.3 ppm SKN+	Ceiling: 0.3 ppm	STEL: 1 ppm Ceiling: 1.5 ppm	Ceiling: 0.3 ppm

Chemical Name	Quebec OEL	Saskatchewan OEL	Yukon OEL
Formaldehyde <0.1%	Ceiling: 2 ppm Ceiling: 3 mg/m³	Ceiling: 0.3 ppm SKN+	Ceiling: 2 ppm Ceiling: 3 mg/m³

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Legend See section 16 for terms and abbreviations

Appropriate engineering controls

Engineering Controls Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection Wear tight sealing safety goggles and/or face protection shield.

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Take off all contaminated clothing and wash it before reuse. Wash hands thoroughly after handling. Regular cleaning of equipment, work area and clothing is recommended.

Environmental exposure controls
Do not allow into any sewer, on the ground or into any body of water.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state Liquid

Gas Under Pressure Not classified according to GHS criteria

Appearance Turbid solution
aqueous solution

Color Milky white

Odor Odorless

Odor threshold No data available

Property	Values	Remarks • Method
Molecular weight	No data available	

pH	8.14	
Melting point/freezing point	0 °C / 32 °F	
Boiling point / boiling range	100 °C / 212 °F	
Evaporation rate	1 (water = 1) Estimation based on theoretical calculation	Estimation based on theoretical calculation
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	Estimation based on theoretical calculation
Vapor density (air = 1)	0.62	
Specific gravity (water = 1 / air = 1)	1.02	
Partition Coefficient (n-octanol/water)	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
Acid	Soluble	> 1000 mg/L	25 °C / 77 °F

Other Information

Metal Corrosivity	Not classified as corrosive to metal according to GHS criteria
Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available
Volatile Organic Compounds (VOC) Content	No information available.
Bulk density	Not applicable
Explosive properties	Not classified according to GHS criteria.
Explosion data	No data available
Upper explosion limit	No data available
Lower explosion limit	No data available

Flammable properties	During a fire, this product decomposes to form toxic gases.
Flammability Limit in Air	
Upper flammability limit:	No data available
Lower flammability limit:	No data available
Flash point	No data available
Oxidizing properties	Not classified according to GHS criteria.
Reactivity propeties	Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria.

10. STABILITY AND REACTIVITY

Reactivity propeties
Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria

Chemical stability
Stable under recommended storage conditions.

Special dangers of the product
No information available

Possibility of Hazardous Reactions
No information available.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid
Poor Ventilation. Extremes of temperature and direct sunlight.

Incompatible materials
Oxidizers. Acids.

Hazardous Decomposition Products
Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

Explosive properties
Not classified according to GHS criteria.

Upper explosion limit No data available

Lower explosion limit No data available

Autoignition temperature
No data available

Sensitivity to Static Discharge
None reported

Sensitivity to Mechanical Impact
None reported

11. TOXICOLOGICAL INFORMATION

NIOSH (RTECS) Number None reported

Information on Likely Routes of Exposure

Product Information	Respiratory sensitizer. Skin sensitizer.
Inhalation	May cause sensitization by inhalation.
Eye contact	No known effect based on information supplied.
Skin contact	May cause sensitization by skin contact.
Ingestion	No known effect based on information supplied.
Aggravated Medical Conditions	Respiratory disorders. Skin disorders.
Toxicologically synergistic products	None known.
Toxicokinetics, metabolism and distribution	See ingredients information below.

Chemical Name	Toxicokinetics, metabolism and distribution
Formaldehyde (<0.1%) CAS#: 50-00-0	Readily Absorbed via the respiratory and gastrointestinal routes. Absorbed formaldehyde can be oxidized to formate and carbon dioxide. Half-life of formaldehyde is 1 min in rat plasma.

Product Acute Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	7,175.00 mg/kg

Ingredient Acute Toxicity Data

Oral Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Rat LD_{50}	569 mg/kg	None reported	None reported	Vendor SDS
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD_{50}	100 mg/kg	None reported	None reported	No information available
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Rat LD_{50}	2840 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse LD_{50}	5989 mg/kg	None reported	None reported	IUCLID (The International Uniform Chemical Information Database)

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD_{Lo}	70 mg/kg	None reported	**Kidney, Ureter, or Bladder** Other changes **Liver**	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Man TD_{Lo}	1500 mg/kg	None reported	**Gastrointestinal** Gas	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TD_{Lo}	643 mg/kg	None reported	**Lungs, Thorax, or Respiration** Respiratory obstruction	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Domestic mammal - Not specified LD_{Lo}	3500 mg/kg	None reported	**Lungs, Thorax, or Respiration** Respiratory stimulation	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD_{50}	270 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC_{50}	250 mg/L	4 hours	None reported	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Skin Corrosion/Irritation Data
No data available.

Ingredient Skin Corrosion/Irritation Data

Chemical Name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Organization for Economic Co-operation and Development (OECD) - Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)

Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Open Irritation Test	Guinea pig	100 mg	5 days	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	2 mg	24 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)

Product Serious Eye Damage/Eye Irritation Data
No data available.

Ingredient Eye Damage/Eye Irritation Data

Chemical Name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Standard Draize Test	Rabbit	100 mg	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	0.750 mg	24 hours	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)

Sensitization Information

Product Sensitization Data

Skin Sensitization Exposure Route No data available.

Respiratory Sensitization Exposure Route No data available.

Ingredient Sensitization Data

Skin Sensitization Exposure Route .

Chemical Name	Test method	Species	Results	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%)	Patch test	Human	Confirmed to be a skin sensitizer	ERMA (New Zealands Environmental Risk Management Authority)

CAS#: 50-00-0				

Respiratory Sensitization Exposure Route .

Chemical Name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD (Concise International Chemical Assessment Documents)

Chronic Toxicity Information

Product Repeat Dose Toxicity Data

Oral Exposure Route No data available.

Dermal Exposure Route No data available.

Inhalation (Dust/Mist) Exposure Route No data available.

Inhalation (Vapor) Exposure Route No data available.

Inhalation (Gas) Exposure Route No data available.

Ingredient Repeat Dose Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Inhalation (Vapor) Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC_{Lo}	0.017 mg/L	0.5 days	**Eye** Lacrimation **Lungs, Thorax, or Respiration** Other changes	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC_{Lo}	2 mg/L	40 minutes	**Lungs, Thorax, or Respiration** Other changes Respiratory depression	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Chemical Name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A2	Group 1	Known	X
Ammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)	X - Present

Product Carcinogenicity Data No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Carcinogenicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	**Olfaction** Tumors	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Germ Cell Mutagenicity*invitro*Data
No data available.

Ingredient Germ Cell Mutagenicity*invitro*Data

Chemical Name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Cell Strain**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Morphological transformation	Hamster kidney	10 mg/L	None reported	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Germ Cell Mutagenicity*invivo*Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	DNA damage	Rat	0.000035 mg/L	8 weeks	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Vapor) Exposure Route

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	2 mg/L	15 minutes	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Reproductive Toxicity Data

Oral Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse TD_{Lo}	14000 mg/kg	4 days	**Effects on Newborn** Other neonatal measures or effects	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route Toxicological data for ingredients is not indicative of likely harm.

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	40 mg/L	14 days	**Effects on Embryo or Fetus** Fetotoxicity (except death e.g. stunted fetus)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.001 mg/L	24 weeks	**Effects on Embryo or Fetus** Cytological changes (including somatic cell genetic material)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.0005 mg/L	19 days	**Specific Developmental Abnormalities**Musculoskeletal system	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

12. ECOLOGICAL INFORMATION

Ecotoxicity Based on the classification principles, not classified as hazardous to the environment.

Product Ecological Data

Aquatic toxicity

Fish No data available

Crustacea No data available

Algae No data available

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Ingredient Ecological Data

Aquatic toxicity

Fish

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	96 hours	*Alburnus alburnus*	LC_{50}	> 10000 mg/L	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	None reported	LC_{50}	56 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%)	96 hours	*Morone saxatilis*	LC_{50}	6.7 mg/L	PEEN (Pan European Ecological Network)

CAS#: 50-00-0					
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	96 hours	*Oncorhynchus mykiss*	LC_{50}	36.7 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	*Pimephales promelas*	LC_{50}	7960 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	None reported	LC_{50}	52.5 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	96 hours	None reported	LC_{50}	365 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Crustacea

Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	48 Hours	*Daphnia magna*	EC_{50}	> 36000 mg/L	EPA (United States Environmental Protection Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	48 Hours	*Daphnia magna*	EC_{50}	3150 mg/L	IUCLID (The International Uniform Chemical Information Database)
Formaldehyde (<0.1%) CAS#: 50-00-0	48 Hours	*Daphnia pulex*	EC_{50}	5.8 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	48 Hours	None reported	LC_{50}	14 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	48 hours	*Daphnia magna*	EC_{50}	29 mg/L	PEEN (Pan European Ecological Network)
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	48 hours	None reported	EC_{50}	59 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Algae

Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	72 hours	*Selenastrum capricornutum*	EC_{50}	> 100 mg/L	CEPA (Canadian Environmental Protection Agency)

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Other Information

Canadian Environmental Protection Act (CEPA) - Domestic Substances List (DSL): Environmentally Hazardous Substances Categorizations				
Chemical Name	**Category**	**Persistent**	**Bioaccumulation**	**Inherently Toxic to Aquatic Organisms**
Ammonium sulfate (<0.1%) CAS#: 7783-20-2	Inorganics	Yes	No	Yes

Persistence and degradability
None known.

Product Biodegradability Data
If available, see ingredient data below.

Ingredient Biodegradability Data
Test data reported below

Chemical Name	Test method	Biodegradation	Exposure time	Results
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	None reported	70%	28 days	Readily biodegradable
Formaldehyde (<0.1%) CAS#: 50-00-0	None reported	99%	28 days	Readily biodegradable

Bioaccumulation
If available, see ingredient data below.

Product Bioaccumulation Data If available, see ingredient data below.

Ingredient Bioaccumulation Data

Chemical Name	Test method	Exposure time	Species	Bioconcentration factor (BCF)	Results
Formaldehyde (<0.1%) CAS#: 50-00-0	None reported	None reported	None reported	None reported	Does not have the potential to bioaccumulate

Additional information

Product Information

Partition Coefficient (n-octanol/water) Not applicable

Ingredient Information

Chemical Name	Partition Coefficient	Method

	(n-octanol/water)	
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{ow} = -2.13	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{ow} = -3	No information available
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{ow} = 0.35	No information available

Mobility
Mobility in soil: High mobility. If available, see ingredient data below.

Product Information

Soil Organic Carbon-Water Partition Coefficient Not applicable

Ingredient Information

Chemical Name	Soil Organic Carbon-Water Partition Coefficient	Method
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{oc} = 2.68	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{oc} = -1.4	Estimation through KOCWIN v2.00 part of the Estimation Programs Interface (EPI) Suite™
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{oc} = 0.89	No information available

Additional information

Water solubility

Product Information

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Ingredient Information

Chemical Name	Water solubility classification	Water solubility	Water solubility temperature °C	Water solubility temperature °F
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	Completely soluble	667000 mg/L	20 °C	68 °F
Sodium sulfate CAS#: 7757-82-6	Completely soluble	160000 mg/L	20 °C	68 °F
Formaldehyde CAS#: 50-00-0	Completely soluble	> 40000 mg/L	20 °C	68 °F
Ammonium sulfate CAS#: 7783-20-2	Completely soluble	767000 mg/L	25 °C	77 °F

Other adverse effects
Contains a substance with an endocrine-disrupting potential.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Contaminated packaging Dispose of in accordance with federal, state and local regulations.

US EPA Waste Number Not applicable, U122

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT Not regulated
Special Provisions

TDG Not regulated

IATA Not regulated

IMDG Not regulated

Note: No special precautions necessary.

Additional information
There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods.
If the item is not in a reagent set or kit, the classification given above applies.
If the item is part of a reagent set or kit the classification would change to the following:
UN3316 Chemical Kit, Hazard Class 9, Packing Group II or III.
If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories

TSCA	Complies
DSL/NDSL	Complies

TSCA- United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL- Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS	Complies
ENCS	Does not comply
IECSC	Complies
KECL	Complies
PICCS	Complies
TCSI	Complies
AICS	Complies
NZIoC	Does not comply

EINECS/ELINCS- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS- Japan Existing and New Chemical Substances

IECSC- China Inventory of Existing Chemical Substances
KECL- Korean Existing and Evaluated Chemical Substances
PICCS- Philippines Inventory of Chemicals and Chemical Substances
TCSI- Taiwan Chemical Substances Inventory
AICS- Australian Inventory of Chemical Substances
NZIoC- New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Ammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical Name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65
This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Ammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information
EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

NFPA and HMIS Classifications

NFPA	**Health hazards** - 2	**Flammability** - 0	**Instability** - 0	**Physical and Chemical Properties** -
HMIS	**Health hazards** - 2	**Flammability** - 0	**Physical hazards** - 0	**Personal protection** - X - See section 8 for more information

Key or legend to abbreviations and acronyms used in the safety data sheet

NIOSH IDLH	*Immediately Dangerous to Life or Health*
ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
NDF	*no data*

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.
SKN*	Skin designation	SKN+	Skin sensitization
RSP+	Respiratory sensitization	**	Hazard Designation
C	Carcinogen	R	Reproductive toxicant
M	mutagen		

Prepared By Hach Product Compliance Department

Issue Date 25-Jul-2016

Revision Date 24-Oct-2016

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2016

End of Safety Data Sheet

SAFETY DATA SHEET

1. IDENTIFICATION

Product identifier
Product Name STABLCAL STD, 800 NTU

Other means of identification
Product Code(s) 2660500

Safety data sheet number M01361

Synonyms

Recommended use of the chemical and restrictions on use
Recommended Use Laboratory Use. Standard solution.
Uses advised against None.
Restrictions on use None.

Details of the supplier of the safety data sheet

Manufacturer Address
Hach Company
P.O.Box 389 Loveland, CO 80539 USA
(970) 669-3050

Emergency telephone number
(303) 623-5716 - 24 Hour Service (515)232-2533 - 8am - 4pm CST

2. HAZARDS IDENTIFICATION

Classification

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

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)
Not applicable

Label elements

Signal word - Danger



Hazard statements
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction EUH208 - May produce an allergic reaction

Precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P284 - Wear respiratory protection
P272 - Contaminated work clothing should not be allowed out of the workplace
P280 - Wear protective gloves
P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P363 - Wash contaminated clothing before reuse
P501 - Dispose of contents/ container to an approved waste disposal plant

Other Information
Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance
Not applicable

Mixture

Synonyms .
Chemical Family Mixture.

Percent ranges are used where confidential product information is applicable.

Chemical Name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	5 - 10%	-
Sodium sulfate	7757-82-6	0.1 - 1%	-
Ammonium sulfate	7783-20-2	0.1 - 1%	-
Formaldehyde	50-00-0	<0.1%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice IF IN EYES: Flush eyes for at least 15 minutes. May cause allergic skin reaction. Repeated contact may cause allergic reactions in very susceptible persons.

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

Skin contact For minor skin contact, avoid spreading material on unaffected skin. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Remove and isolate contaminated clothing and shoes. Call a POISON CENTER or doctor if you feel unwell. If skin irritation persists, call a physician. May cause an allergic skin reaction. Consult a physician if necessary.

Inhalation May cause allergic respiratory reaction. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

Ingestion IF SWALLOWED: Rinse Mouth. If symptoms persist, call a physician.

Self-protection of the first aider Use personal protective equipment as required. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Most important symptoms and effects, both acute and delayed

Symptoms See Section 11: TOXICOLOGICAL INFORMATION.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Causes sensitization.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media No information available.

Flammable properties
During a fire, this product decomposes to form toxic gases.

Specific hazards arising from the chemical
May react violently with. Strong acids. Strong oxidizers. Thermal decomposition can lead to release of irritating and toxic gases and vapors. In the event of fire and/or explosion do not breathe fumes. May cause sensitization in susceptible persons.

Hazardous combustion products This material will not burn.

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

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations

should respond to a spill involving chemicals.

EC Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

WHMIS Notice Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Personal precautions, protective equipment and emergency procedures

Personal precautions Evacuate personnel to safe areas. Do not touch or walk through spilled material. Ventilate affected area. Use personal protective equipment as required.

For emergency responders Use personal protection recommended in Section 8.

Environmental precautions

Environmental precautions Prevent entry into waterways, sewers, basements or confined areas. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up Neutralize spill if necessary. Soak up with inert absorbent material. Take up mechanically, placing in appropriate containers for disposal. Clean contaminated surface thoroughly. Dispose of in accordance with local, state and federal regulations or laws.

Emergency Response Guide Number Not applicable

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Do not breathe dust/fume/gas/mist/vapors/spray.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep out of the reach of children. Keep container tightly closed. Keep containers tightly closed in a cool, well-ventilated place.

Flammability class Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Formaldehyde <0.1%	Ceiling: 0.3 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Chemical Name	Alberta OEL	British Columbia OEL	Manitoba OEL	New Brunswick OEL	New Foundland & Labrador OEL
Formaldehyde <0.1%	Ceiling: 1 ppm Ceiling: 1.3 mg/m³ TWA: 0.75 ppm TWA: 0.9 mg/m³	TWA: 0.3 ppm Ceiling: 1 ppm SKN+	Ceiling: 0.3 ppm	TWA: 0.5 ppm STEL: 1.5 ppm	RSP+ Ceiling: 0.3 ppm SKN+

Chemical Name	Northwest Territories OEL	Nova Scotia OEL	Nunavut OEL	Ontario TWA	Prince Edward Island OEL
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 5 - 10%	NDF	NDF	NDF	STEL: 0.35 ppm STEL: 2 mg/m³	NDF
Formaldehyde <0.1%	Ceiling: 0.3 ppm SKN+	RSP+ Ceiling: 0.3 ppm SKN+	Ceiling: 0.3 ppm	STEL: 1 ppm Ceiling: 1.5 ppm	Ceiling: 0.3 ppm

Chemical Name	Quebec OEL	Saskatchewan OEL	Yukon OEL
Formaldehyde <0.1%	Ceiling: 2 ppm Ceiling: 3 mg/m³	Ceiling: 0.3 ppm SKN+	Ceiling: 2 ppm Ceiling: 3 mg/m³

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Legend See section 16 for terms and abbreviations

Appropriate engineering controls

Engineering Controls
Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection Wear tight sealing safety goggles and/or face protection shield. Avoid contact with eyes. Wear safety glasses with side shields (or goggles).

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

General Hygiene Considerations Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wear suitable gloves and eye/face protection. Wash face, hands and any exposed skin thoroughly after handling. Regular cleaning of equipment, work area and clothing is recommended. Handle in accordance with good industrial hygiene and safety practice. Avoid prolonged or repeated contact with skin. Take off all contaminated clothing and wash it before reuse. Do not eat, drink or smoke when using this product. Keep away from food, drink and animal feeding stuffs.

Environmental exposure controls
Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state Liquid

Gas Under Pressure Not classified according to GHS criteria

Appearance	Turbid solution aqueous solution	**Color**	Milky white
Odor	Odorless	**Odor threshold**	No data available

Property	**Values**	**Remarks • Method**
Molecular weight	No data available	
pH	7.47	
Melting point/freezing point	0 °C / 32 °F	
Boiling point / boiling range	100 °C / 212 °F	
Evaporation rate	1 (water = 1) Estimation based on theoretical calculation	Estimation based on theoretical calculation
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	Estimation based on theoretical calculation
Vapor density (air = 1)	0.62	
Specific gravity (water = 1 / air = 1)	1.02	
Partition Coefficient (n-octanol/water)	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
Acid	Soluble	> 1000 mg/L	25 °C / 77 °F

Other Information

Metal Corrosivity	Not classified as corrosive to metal according to GHS criteria
Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available
Volatile Organic Compounds (VOC) Content	No information available.

Bulk density	Not applicable
Explosive properties	Not classified according to GHS criteria.
Explosion data	No data available
Upper explosion limit	No data available
Lower explosion limit	No data available
Flammable properties	During a fire, this product decomposes to form toxic gases.
Flammability Limit in Air	
Upper flammability limit:	No data available
Lower flammability limit:	No data available
Flash point	No data available
Oxidizing properties	Not classified according to GHS criteria.
Reactivity propeties	Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria.

10. STABILITY AND REACTIVITY

Reactivity propeties
Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria

Chemical stability
Stable under recommended storage conditions.

Special dangers of the product
No information available

Possibility of Hazardous Reactions
No information available.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid
Extremes of temperature and direct sunlight. Incompatible materials.

Incompatible materials
Strong oxidizing agents. Strong acids. Strong bases.

Hazardous Decomposition Products
Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

Explosive properties
Not classified according to GHS criteria.

Upper explosion limit No data available

Lower explosion limit No data available

Autoignition temperature
No data available

Sensitivity to Static Discharge
None reported

Sensitivity to Mechanical Impact
None reported

11. TOXICOLOGICAL INFORMATION

NIOSH (RTECS) Number None reported

Information on Likely Routes of Exposure

Product Information	Respiratory sensitizer. Skin sensitizer.
Inhalation	May cause sensitization by inhalation.
Eye contact	No known effect based on information supplied.
Skin contact	May cause sensitization by skin contact.
Ingestion	No known effect based on information supplied.
Aggravated Medical Conditions	Respiratory disorders. Skin disorders.
Toxicologically synergistic products	None known.
Toxicokinetics, metabolism and distribution	See ingredients information below.

Chemical Name	Toxicokinetics, metabolism and distribution
Formaldehyde (<0.1%) CAS#: 50-00-0	Readily Absorbed via the respiratory and gastrointestinal routes. Absorbed formaldehyde can be oxidized to formate and carbon dioxide. Half-life of formaldehyde is 1 min in rat plasma.

Product Acute Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	7,931.00 mg/kg

Ingredient Acute Toxicity Data

Oral Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Mouse LD_{50}	569 mg/kg	None reported	None reported	Vendor SDS NIOSH (National Institute for Occupational Safety and Health)
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	Rat LD_{50}	2840 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident

					Insurance)
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD_{50}	100 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse LD_{50}	5989 mg/kg	None reported	None reported	IUCLID (The International Uniform Chemical Information Database)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	Man TD_{Lo}	1500 mg/kg	None reported	**Gastrointestinal** Gas	RTECS (Registry of Toxic Effects of Chemical Substances)
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD_{Lo}	70 mg/kg	None reported	**Gastrointestinal** **Kidney, Ureter, or Bladder** **Liver** Other changes Ulcerated stomach Other changes	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	Domestic mammal - Not specified LD_{Lo}	3500 mg/kg	None reported	**Lungs, Thorax, or Respiration** Respiratory stimulation	RTECS (Registry of Toxic Effects of Chemical Substances)
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TD_{Lo}	643 mg/kg	None reported	**Gastrointestinal** **Lungs, Thorax, or Respiration** Nausea or vomiting Respiratory obstruction Ulcerated stomach	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD_{50}	270 mg/kg	None reported	None reported	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC_{50}	250 mg/L	4 hours	None reported	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Skin Corrosion/Irritation Data
No data available.

Ingredient Skin Corrosion/Irritation Data
If available, see data below

Chemical Name	Test method	Species	Reported	Exposure	Results	Key literature

			dose	time		references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Organization for Economic Co-operation and Development (OECD) - Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Open Irritation Test	Guinea pig	100 mg	5 days	Not corrosive or irritating to skin	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	2 mg	24 hours	Corrosive to skin	RTECS (Registry of Toxic Effects of Chemical Substances)

Product Serious Eye Damage/Eye Irritation Data
No data available.

Ingredient Eye Damage/Eye Irritation Data
If available, see data below

Chemical Name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Standard Draize Test	Rabbit	100 mg	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA (The European Chemicals Agency)
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test method**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Rabbit	0.750 mg	24 hours	Corrosive to eyes	RTECS (Registry of Toxic Effects of Chemical Substances)

Sensitization Information

Product Sensitization Data

Skin Sensitization Exposure Route No data available.

Respiratory Sensitization Exposure Route No data available.

Ingredient Sensitization Data

Skin Sensitization Exposure Route If available, see data below.

Chemical Name	Test method	Species	Results	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA (New Zealands Environmental Risk Management Authority)

Respiratory Sensitization Exposure Route If available, see data below.

Chemical Name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB (Hazardous Substances Data Bank)
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD (Concise International Chemical Assessment Documents)

Chronic Toxicity Information

Product Repeat Dose Toxicity Data

Oral Exposure Route No data available.

Dermal Exposure Route No data available.

Inhalation (Dust/Mist) Exposure Route No data available.

Inhalation (Vapor) Exposure Route No data available.

Inhalation (Gas) Exposure Route No data available.

Ingredient Repeat Dose Toxicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route If available, see data below

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC_{Lo}	0.017 mg/L	0.5 days	**Eye** **Lungs, Thorax, or Respiration** Lacrimation Other changes	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde	Human	2 mg/L	40 minutes	**Lungs, Thorax, or Respiration**	RTECS (Registry of Toxic

(<0.1%) CAS#: 50-00-0	TC_{Lo}			Other changes Respiratory depression	Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Chemical Name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Ammonium sulfate	7783-20-2	-	-	-	-
Formaldehyde	50-00-0	A2	Group 1	Known	X

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)	X - Present

Product Carcinogenicity Data No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Carcinogenicity Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	**Olfaction** Tumors	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Product Germ Cell Mutagenicity*invitro*Data
No data available.

Ingredient Germ Cell Mutagenicity*invitro*Data If available, see data below

Chemical Name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyc	Cytogenetic	Human HeLa Cell	1 mmol/L	None	Positive test result for	RTECS (Registry

lo[3.3.1.1(3,7)]decan e (5 - 10%) CAS#: 100-97-0	analysis			reported	mutagenicity	of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Cell Strain**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	Morphological transformation	Hamster kidney	10 mg/L	None reported	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Germ Cell Mutagenicity*invivo*Data

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route If available, see data below

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	DNA damage	Rat	0.000035 mg/L	8 weeks	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Test**	**Species**	**Reported dose**	**Exposure time**	**Results**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	2 mg/L	15 minutes	Positive test result for mutagenicity	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

Oral Exposure Route No data available

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route No data available

Inhalation (Gas) Exposure Route No data available

Ingredient Reproductive Toxicity Data

Oral Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	Mouse TD_{Lo}	14000 mg/kg	4 days	**Effects on Newborn** Other neonatal measures or effects	RTECS (Registry of Toxic Effects of Chemical Substances)

Dermal Exposure Route No data available

Inhalation (Dust/Mist) Exposure Route No data available

Inhalation (Vapor) Exposure Route If available, see data below

Chemical Name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	40 mg/L	14 days	**Effects on Embryo or Fetus** Fetotoxicity (except death e.g. stunted fetus)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.001 mg/L	24 weeks	**Effects on Embryo or Fetus** Cytological changes (including somatic cell genetic material)	RTECS (Registry of Toxic Effects of Chemical Substances)
Chemical Name	**Endpoint type**	**Reported dose**	**Exposure time**	**Toxicological effects**	**Key literature references and sources for data**
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC_{Lo}	.0005 mg/L	19 days	**Specific Developmental Abnormalities**Musculoskeletal system	RTECS (Registry of Toxic Effects of Chemical Substances)

Inhalation (Gas) Exposure Route No data available

12. ECOLOGICAL INFORMATION

Ecotoxicity Based on the classification principles, not classified as hazardous to the environment.

Product Ecological Data

Aquatic toxicity

Fish No data available

Crustacea No data available

Algae No data available

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Ingredient Ecological Data

Aquatic toxicity

Fish If available, see ingredient data below

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	96 hours	*Alburnus alburnus*	LC_{50}	> 10000 mg/L	Vendor SDS
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	None reported	LC_{50}	56 mg/L	IUCLID (The International Uniform Chemical Information Database)
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	96 hours	*Oncorhynchus mykiss*	LC_{50}	36.7 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	*Morone saxatilis*	LC_{50}	6.7 mg/L	PEEN (Pan European Ecological Network)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	96 hours	*Pimephales promelas*	LC_{50}	7960 mg/L	IUCLID (The International Uniform Chemical Information Database)
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	96 hours	None reported	LC_{50}	365 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	None reported	LC_{50}	52.5 mg/L	PEEN (Pan European Ecological Network)

Crustacea If available, see ingredient data below

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	48 Hours	*Daphnia magna*	EC_{50}	> 36000 mg/L	EPA (United States Environmental Protection Agency)
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	48 Hours	*Daphnia magna*	EC_{50}	3150 mg/L	IUCLID (The International Uniform Chemical Information Database)
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	48 Hours	None reported	LC_{50}	14 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Formaldehyde (<0.1%) CAS#: 50-00-0	48 Hours	*Daphnia pulex*	EC_{50}	5.8 mg/L	PEEN (Pan European Ecological Network)
Chemical Name	**Exposure time**	**Species**	**Endpoint type**	**Reported dose**	**Key literature references and sources for data**
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	48 hours	None reported	EC_{50}	59 mg/L	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
Formaldehyde (<0.1%) CAS#: 50-00-0	48 hours	*Daphnia magna*	EC_{50}	29 mg/L	PEEN (Pan European Ecological Network)

Algae If available, see ingredient data below

Chemical Name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	72 hours	*Selenastrum capricornutum*	EC_{50}	> 100 mg/L	CEPA (Canadian Environmental Protection Agency)

Terrestrial toxicity

Soil No data available

Vertebrates No data available

Invertebrates No data available

Other Information

Canadian Environmental Protection Act (CEPA) - Domestic Substances List (DSL): Environmentally Hazardous Substances Categorizations

Chemical Name	Category	Persistent	Bioaccumulation	Inherently Toxic to Aquatic Organisms
Ammonium sulfate (0.1 - 1%) CAS#: 7783-20-2	Inorganics	Yes	No	Yes

Persistence and degradability
None known.

Product Biodegradability Data
If available, see ingredient data below.

Ingredient Biodegradability Data
Test data reported below

Chemical Name	Test method	Biodegradation	Exposure time	Results
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	None reported	70%	28 days	Readily biodegradable

Bioaccumulation
If available, see ingredient data below.

Product Bioaccumulation Data If available, see ingredient data below.

Ingredient Bioaccumulation Data No data available

Chemical Name	Test method	Exposure time	Species	Bioconcentration factor (BCF)	Results
Formaldehyde (<0.1%)	None reported	None reported	None reported	None reported	Does not have the

CAS#: 50-00-0					potential to bioaccumulate

Additional information

Product Information

Partition Coefficient (n-octanol/water) Not applicable

Ingredient Information

Chemical Name	Partition Coefficient (n-octanol/water)	Method
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{ow} = .?	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{ow} = -3	No information available
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{ow} = 0.35	No information available

Mobility
Mobility in soil: High mobility. If available, see ingredient data below.

Product Information

Soil Organic Carbon-Water Partition Coefficient Not applicable

Ingredient Information

Chemical Name	Soil Organic Carbon-Water Partition Coefficient	Method
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (5 - 10%) CAS#: 100-97-0	log K_{oc} = .?	No information available
Sodium sulfate (0.1 - 1%) CAS#: 7757-82-6	log K_{oc} = -1.4	Estimation through KOCWIN v2.00 part of the Estimation Programs Interface (EPI) Suite™
Formaldehyde (<0.1%) CAS#: 50-00-0	log K_{oc} = 0.89	No information available

Additional information

Water solubility

Product Information

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Ingredient Information

Chemical Name	Water solubility classification	Water solubility	Water solubility temperature °C	Water solubility temperature °F
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	Completely soluble	667000 mg/L	20 °C	68 °F

Sodium sulfate CAS#: 7757-82-6	Completely soluble	160000 mg/L	20 °C	68 °F
Ammonium sulfate CAS#: 7783-20-2	Completely soluble	767000 mg/L	25 °C	77 °F
Formaldehyde CAS#: 50-00-0	Completely soluble	> 40000 mg/L	20 °C	68 °F

Other adverse effects
Contains a substance with an endocrine-disrupting potential.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Contaminated packaging Dispose of in accordance with federal, state and local regulations.

US EPA Waste Number Not applicable, U122

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT Not regulated
Special Provisions

TDG Not regulated

IATA Not regulated

IMDG Not regulated

Note: No special precautions necessary.

Additional information
There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods.
If the item is not in a reagent set or kit, the classification given above applies.
If the item is part of a reagent set or kit the classification would change to the following:
UN3316 Chemical Kit, Hazard Class 9, Packing Group II or III.
If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories
TSCA Complies
DSL/NDSL Complies

TSCA- United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL- Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS	Complies
ENCS	Complies
IECSC	Complies
KECL	Complies
PICCS	Complies
TCSI	Complies
AICS	Complies
NZIoC	Complies

EINECS/ELINCS- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS- Japan Existing and New Chemical Substances
IECSC- China Inventory of Existing Chemical Substances
KECL- Korean Existing and Evaluated Chemical Substances
PICCS- Philippines Inventory of Chemicals and Chemical Substances
TCSI- Taiwan Chemical Substances Inventory
AICS- Australian Inventory of Chemical Substances
NZIoC- New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	SARA 313 - Threshold Values %
Ammonium sulfate (CAS #: 7783-20-2)	1.0
Formaldehyde (CAS #: 50-00-0)	0.1

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical Name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde (<0.1%)	Release - Toxic (solution)

CAS#: 50-00-0	

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Ammonium sulfate 7783-20-2	-	X	X
Formaldehyde 50-00-0	X	X	X

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Additional information

Global Automotive Declarable Substance List (GADSL)

Chemical Name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thersholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %
Formaldehyde 50-00-0	Declarable Substance (FI) Prohibited Substance (LR) Declarable Substance (LR)	0.1 % 0.0 %

Special Comments
None

NFPA and HMIS Classifications

NFPA	**Health hazards** - 2	**Flammability** - 0	**Instability** - 0	**Physical and Chemical Properties** -
HMIS	**Health hazards** - 2	**Flammability** - 0	**Physical Hazards** - 0	**Personal protection** - X - See section 8 for more information

Key or legend to abbreviations and acronyms used in the safety data sheet

NIOSH IDLH — *Immediately Dangerous to Life or Health*
ACGIH — ACGIH (American Conference of Governmental Industrial Hygienists)

NDF	*no data*

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.
SKN*	Skin designation	SKN+	Skin sensitization
RSP+	Respiratory sensitization	**	Hazard Designation
C	Carcinogen	R	Reproductive toxicant
M	mutagen		

Prepared By	Hach Product Compliance Department
Issue Date	21-Jun-2016
Revision Date	23-Feb-2017
Revision Note	None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2016

End of Safety Data Sheet

Safety Data Sheet
According to the (US) Hazard Communication Standard (29 CFR 1910.1200)

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name	Buffer Solution pH 4.00	
Catalog Number	**YSI 3821**	
Product Description	Laboratory chemical, for use in calibrating pH probes.	
Supplier	YSI, a Xylem brand Telephone: 937-767-7241 Emergency: CHEMTREC US/Can: 800-424-9300 International: 001 703-572-3997	1725 Brannum Lane Yellow Springs, OH 45387 MSDSinfo@ysi.com YSI.com Collect calls accepted
Manufacturer	NCL of Wisconsin, Inc. Telephone: 1-800-648-7836 Email: nclabs@nclabs.com	PO Box 8, Birnamwood, WI 54414 Fax: 715-449-2454 Emergency Contact: 1-800-424-9300 (Chemtrec)

SECTION 2: HAZARDS IDENTIFICATION

GHS Classification	Not classified
Signal Word	Not applicable
Pictograms	None
Hazard Statements	Not applicable
Precautionary Statements	Not applicable
Other Hazards Not Contributing to the Classification	None under normal conditions.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Identity	Not applicable
Common Name	Not applicable

Mixture

Name	CAS #	Approximate %
Water	7732-18-5	>98.8
Potassium Hydrogen Phthalate	877-24-7	1.1
Red Food Coloring	Not found	<0.001

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

General First Aid Measures	Never give anything by mouth to an unconscious person. Seek medical advice if you feel unwell.
If Inhaled	Remove person to fresh air and keep comfortable for breathing. Allow victim to rest.
In Case of Skin Contact	Remove contaminated clothing and wash exposed skin with mild soap and water. Rinse with warm water.
In Case of Eye Contact	Immediately flush eyes with plenty of water. Remove contact lenses, if present and easy to do. Get medical attention if irritation develops.
If Swallowed	Rinse mouth. Do NOT induce vomiting. Get medical attention if you feel unwell.

Most Important Symptoms/Effects Acute and Delayed

Not expected to present a significant hazard under normal use.

Indication of Immediate Medical Attention and Special Treatment Needed

No additional information available.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media	Foam. Dry powder. Sand. Carbon dioxide. Water spray.
Unsuitable Extinguishing Media	Do not use high pressure water stream.
Special Hazards Arising from the Chemical	No additional information available.
Special Protective Actions for Fire-Fighters	Wear self-contained breathing apparatus and protective clothing. Keep exposed containers cool with water spray.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

Personal Precautions	Use personal protective equipment (see section 8). Evacuate area of non-essential personnel. Eliminate ignition sources.
Environmental Precautions	Prevent entry to surface and ground waters.
Methods and Materials for Containment and Cleaning Up	Clean up spills with inert solids. Collect spillage. Store away from other materials. Ensure compliance with federal, state, and local regulations.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling	Avoid contact with eyes and skin. Avoid breathing vapors. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.
Conditions for Safe Storage Including any Incompatibilities	Keep in a tightly closed container, stored in a cool, dry, ventilated area. Store away from strong oxidizers.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters	Not applicable
Appropriate Engineering Controls	Provide adequate general ventilation. Maintain eye-wash fountain and quick-drench facilities in work area.
Individual Protection Measures	Avoid all unnecessary exposure.
Eye/Face Protection	Use chemical safety goggles and /or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye-wash fountain and quick-drench facilities in work area.
Skin Protection	Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Respiratory Protection	Wear appropriate mask.
Other Information	Do not eat, drink, or smoke when using this product.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Color	Red to pink
Odor	Odorless
Odor Threshold	Not determined
pH	4
Melting Point/Freezing Point	Not determined
Initial Boiling Point and Boiling Range	Not determined
Flash Point	Not determined
Evaporation Rate	Not determined
Flammability (Solid, Gas)	Not determined
Upper/Lower Flammability/Explosive Limits	Not determined
Vapor Pressure	Not determined
Vapor Density	Not determined

Relative Density	1.00
Solubility	Soluble in water.
Partition Coefficient: n-octanol/water	Not determined
Auto-Ignition Temperature	Not determined
Decomposition Temperature	Not determined
Viscosity	Not determined

SECTION 10: STABILITY AND REACTIVITY

Reactivity	No data available
Chemical Stability	Stable under ordinary conditions of use and storage.
Possibility of Hazardous Reactions	No data available
Conditions to Avoid	Extremely high or low temperatures.
Incompatible Materials	Strong oxidizers.
Hazardous Decomposition Products	When heated to decomposition, can emit toxic gases, carbon dioxide, and carbon monoxide.

SECTION 11: TOXICOLOGICAL INFORMATION

Acute Toxicity Not classified

Potassium Hydrogen Phthalate (877-24-7)	
LD50 oral rat	≥3200 mg/kg
Water (7732-18-5)	
LD50 oral rat	≥90000 mg/kg

Skin Corrosion/Irritation	Not classified
Serious Eye Damage/Irritation	Not classified
Respiratory or Skin Sensitization	Not classified
Germ Cell Mutagenicity	Not classified
Carcinogenicity	Not classified
Reproductive Toxicity	Not classified
Specific Target Organ Toxicity (Single Exposure)	Not classified
Specific Target Organ Toxicity (Repeated Exposure)	Not classified
Aspiration Hazard	Not classified
Potential Adverse Human Health Effects and Symptoms	No data available
Other Information	Not available

SECTION 12: ECOLOGICAL INFORMATION

Toxicity	Not applicable
Persistence and Degradability	Not applicable
Bioaccumulative Potential	Not applicable
Mobility in Soil	Not applicable
Other Adverse Effects	Not applicable

SECTION 13: DISPOSAL CONSIDERATIONS

Methods of Disposal

Disposal Recommendations	Dispose of contents/containers in accordance with federal, state, and local regulations.
Other Information	Avoid release to the surrounding environment.

SECTION 14: TRANSPORT INFORMATION

UN Number	Not applicable
UN Shipping Name	Not applicable
Transport Hazard Class(es)	Not applicable
Packing Group	Not applicable
Environmental Hazards	Not applicable
Transport in Bulk	Not applicable
Other Precautions	Not applicable

SECTION 15: REGULATORY INFORMATION

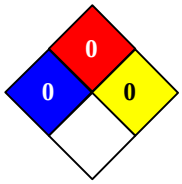
Potassium Hydrogen Phthalate (877-24-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Water (7732-18-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

SECTION 16: OTHER INFORMATION

Revision Date: 12/10/2014

NFPA Hazards

Health Hazard	0: Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.
Fire Hazard	0: Materials that will not burn.
Instability/Reactivity	0: Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health	0: No significant risk to health.
Flammability	0: Materials that will not burn.
Physical Hazard	0: Materials that are normally stable.
Personal Protection	A

YSI 3821	
Health	0
Flammability	0
Physical Hazard	0
Personal Protection	A

The information contained herein is provided in good faith and is believed to be correct as of the date hereof. However, NCL of Wisconsin, Inc. makes no representation as to the comprehensiveness or accuracy of the information. It is expected that individuals receiving the information will exercise their independent judgment in determining its appropriateness for their conditions of use. Accordingly, NCL of Wisconsin, Inc. will not be responsible for damages of any kind resulting from the use of or reliance upon such information.

END OF SAFETY DATA SHEET

Safety Data Sheet
According to the (US) Hazard Communication Standard (29 CFR 1910.1200)

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name Buffer Solution pH 7.00

Catalog Number **YSI 3822**

Product Description Laboratory chemical, for use in calibrating pH probes

Supplier

YSI, a Xylem brand
Telephone: 937-767-7241
Emergency: CHEMTREC
US/Can: 800-424-9300
International: 001 703-572-3997

1725 Brannum Lane
Yellow Springs, OH 45387
MSDSinfo@ysi.com
YSI.com
Collect calls accepted

Manufacturer

NCL of Wisconsin, Inc.
Telephone: 1-800-648-7836
Email: nclabs@nclabs.com

PO Box 8, Birnamwood, WI 54414
Fax: 715-449-2454
Emergency Contact: 1-800-424-9300 (Chemtrec)

SECTION 2: HAZARDS IDENTIFICATION

GHS Classification Not classified

Signal Word Not applicable

Pictograms None

Hazard Statements Not applicable

Precautionary Statements Not applicable

Other Hazards Not Contributing to the Classification None under normal conditions

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Identity Not applicable

Common Name Not applicable

Mixture

Name	CAS #	Approximate %
Water	7732-18-5	>98
Potassium Phosphate Monobasic	7778-77-0	<1
Yellow Food Coloring	Not found	<0.001

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

General First Aid Measures Never give anything by mouth to an unconscious person. Seek medical advice if you feel unwell.

If Inhaled Remove person to fresh air and keep comfortable for breathing. Allow victim to rest.

In Case of Skin Contact Remove contaminated clothing and wash exposed skin with mild soap and water. Rinse with warm water.

In Case of Eye Contact Immediately flush eyes with plenty of water. Remove contact lenses, if present and easy to do. Get medical attention if irritation develops.

If Swallowed Rinse mouth. Do NOT induce vomiting. Get medical attention if you feel unwell.

Most Important Symptoms/Effects Acute and Delayed

Not expected to present a significant hazard under normal use.

Indication of Immediate Medical Attention and Special Treatment Needed

No additional information available.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media	Foam. Dry powder. Sand. Carbon dioxide. Water spray.
Unsuitable Extinguishing Media	Do not use high pressure water stream.
Special Hazards Arising from the Chemical	No additional information available.
Special Protective Actions for Fire-Fighters	Wear self-contained breathing apparatus and protective clothing. Keep exposed containers cool with water spray.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

Personal Precautions	Use personal protective equipment (see section 8). Evacuate area of non-essential personnel. Eliminate ignition sources.
Environmental Precautions	Prevent entry to surface and ground waters.
Methods and Materials for Containment and Cleaning Up	Clean up spills with inert solids. Collect spillage. Store away from other materials. Ensure compliance with federal, state, and local regulations.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling	Avoid contact with eyes and skin. Avoid breathing vapors. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.
Conditions for Safe Storage Including any Incompatibilities	Keep in a tightly closed container, stored in a cool, dry, ventilated area. Store away from strong oxidizers.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters	Not applicable
Appropriate Engineering Controls	Provide adequate general ventilation. Maintain eye-wash fountain and quick-drench facilities in work area.
Individual Protection Measures	Avoid all unnecessary exposure.
Eye/Face Protection	Use chemical safety goggles and /or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye-wash fountain and quick-drench facilities in work area.
Skin Protection	Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Respiratory Protection	Wear appropriate mask.
Other Information	Do not eat, drink, or smoke when using this product.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Color	Yellow
Odor	Odorless
Odor Threshold	Not determined
pH	7
Melting Point/Freezing Point	Not determined
Initial Boiling Point and Boiling Range	Not determined
Flash Point	Not determined
Evaporation Rate	Not determined
Flammability (Solid, Gas)	Not determined
Upper/Lower Flammability/Explosive Limits	Not determined
Vapor Pressure	Not determined
Vapor Density	Not determined

Relative Density	1.00
Solubility	Soluble in water
Partition Coefficient: n-octanol/water	Not determined
Auto-Ignition Temperature	Not determined
Decomposition Temperature	Not determined
Viscosity	Not determined

SECTION 10: STABILITY AND REACTIVITY

Reactivity	No data available
Chemical Stability	Stable under ordinary conditions of use and storage
Possibility of Hazardous Reactions	No data available
Conditions to Avoid	Extremely high or low temperatures
Incompatible Materials	Strong oxidizers
Hazardous Decomposition Products	When heated to decomposition, can emit toxic gases, carbon dioxide, carbon monoxide, phosphorus oxides, and sodium oxide

SECTION 11: TOXICOLOGICAL INFORMATION

Acute Toxicity Not classified

Potassium Hydrogen Phthalate (877-24-7)	
LD50 dermal rabbit	4640 mg/kg
Water (7732-18-5)	
LD50 oral rat	≥90000 mg/kg

Skin Corrosion/Irritation	Not classified
Serious Eye Damage/Irritation	Not classified
Respiratory or Skin Sensitization	Not classified
Germ Cell Mutagenicity	Not classified
Carcinogenicity	Not classified
Reproductive Toxicity	Not classified
Specific Target Organ Toxicity (Single Exposure)	Not classified
Specific Target Organ Toxicity (Repeated Exposure)	Not classified
Aspiration Hazard	Not classified
Potential Adverse Human Health Effects and Symptoms	No data available
Other Information	Not available

SECTION 12: ECOLOGICAL INFORMATION

Toxicity	Not applicable
Persistence and Degradability	Not applicable
Bioaccumulative Potential	Not applicable
Mobility in Soil	Not applicable
Other Adverse Effects	Not applicable

SECTION 13: DISPOSAL CONSIDERATIONS

Methods of Disposal

Disposal Recommendations	Dispose of contents/containers in accordance with federal, state, and local regulations
Other Information	Avoid release to the surrounding environment

SECTION 14: TRANSPORT INFORMATION

UN Number	Not applicable
UN Shipping Name	Not applicable
Transport Hazard Class(es)	Not applicable
Packing Group	Not applicable
Environmental Hazards	Not applicable
Transport in Bulk	Not applicable
Other Precautions	Not applicable

SECTION 15: REGULATORY INFORMATION

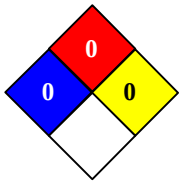
Potassium Hydrogen Phthalate (7778-77-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Water (7732-18-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

SECTION 16: OTHER INFORMATION

Revision Date: 12/10/2014

NFPA Hazards

Health Hazard	0: Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.
Fire Hazard	0: Materials that will not burn.
Instability/Reactivity	0: Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health	0: No significant risk to health.
Flammability	0: Materials that will not burn.
Physical Hazard	0: Materials that are normally stable.
Personal Protection	A

YSI 3821	
Health	0
Flammability	0
Physical Hazard	0
Personal Protection	A

The information contained herein is provided in good faith and is believed to be correct as of the date hereof. However, NCL of Wisconsin, Inc. makes no representation as to the comprehensiveness or accuracy of the information. It is expected that individuals receiving the information will exercise their independent judgment in determining its appropriateness for their conditions of use. Accordingly, NCL of Wisconsin, Inc. will not be responsible for damages of any kind resulting from the use of or reliance upon such information.

END OF SAFETY DATA SHEET

SAFETY DATA SHEET

Revision date 14/03/2017 **Version** 3
Date of the previous version 05/02/2014 EN

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product Name	**Nitric acid 60%**
Chemical name	Nitric acid
CAS-No	7697-37-2
EC-No	231-714-2
REACH registration number	01-2119487297-23-0027
Formula	HNO_3

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

Recommended Use	Industrial use, Professional use. See annex for more detailed information.
Uses advised against	Consumer use.

1.3 Details of the supplier of the safety data sheet

OCI Nitrogen BV
Mijnweg 1
P.O. Box 601
6160 AP Geleen, The Netherlands
Tel: +31 (0) 46 7020111
www.ocinitrogen.com

info.agro@ocinitrogen.com

1.4 Emergency telephone number

UK National Health Service (NHS) call 111 or, in life-threatening emergencies, call 999

WAL National Health Service (NHS) call 0845 46 47

IE National Poisons Information Centre
+353 1 809 2566 or +353 1 837 9964 (only for healthcare professionals)

Manufacturer: Alert & Care Centre Chemelot (Geleen, The Netherlands)
+31 46 4765555 (24/7)

SECTION 2: HAZARDS IDENTIFICATION

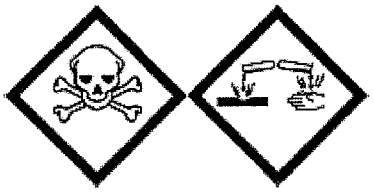
2.1 Classification of the substance or mixture

Classification (1272/2008/EC)

Acute Inhalation Toxicity	Category 3 - H331
Skin Corrosion/Irritation	Category 1A - H314
Corrosive to Metals	Category 1 - H290

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

2.2 Label elements



Signal word
Danger

Hazard statements
H290 - May be corrosive to metals
H314 - Causes severe skin burns and eye damage
H331 - Toxic if inhaled

EUH071 - Corrosive to the respiratory tract

Precautionary Statements
P260 - Do not breathe dust/fume/gas/mist/vapours/spray
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed

2.3 Other hazards

None known.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Chemical name	EC-No	CAS-No	Weight %	Classification (1272/2008/EC)	REACH registration number
Nitric acid	231-714-2	7697-37-2	20-65	Ox. Liq. 2 H272 Met. Corr. H290 Skin Corr. 1A H314 Acute Tox. 3 H331	01-2119487297-23-0027

Concentration Limits Oxid. Liquid 2 >= 99.0%, Oxid. Liquid 3 >= 65.0% < 99.0%, Skin Corr. 1A >= 20.0%, Skin Corr. 1B >= 5.0% < 20.0%, Acute Tox. 3 >26% - <=100%, Acute Tox. 4 >13% - <=26%.

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

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General Advice Immediate medical attention is required. Remove from exposure, lie down. Do not breathe vapours, mist or gas. Do not get in eyes, on skin, or on clothing. Use first aid treatment according to the nature of the injury: Flush with plenty of water or Diphotherine.

Eye Contact Get medical attention. Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes.

Skin Contact Get medical attention. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Wash contaminated clothing before re-use.

Ingestion Get medical attention. Rinse mouth thoroughly with water. Give small quantities of water to drink. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. If victim is unconscious, monitor pulse, breathing and airway.

Inhalation Get medical attention. Remove to fresh air and keep at rest in a position comfortable for breathing. If breathing is difficult, (trained personnel should) give oxygen. It may be dangerous to give mouth-to-mouth resuscitation. Move to fresh air in case of accidental inhalation of vapours or decomposition products: Symptoms may be delayed.

Protection of first-aiders Use personal protective equipment. Avoid contact with skin, eyes and clothing.

4.2 Most important symptoms and effects, both acute and delayed

Main symptoms Causes severe skin burns and eye damage. Can burn mouth, throat, and stomach. Pain, blistering, Burning feeling and temporary redness.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically. Symptoms may be delayed.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable Extinguishing Media The product itself does not burn. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media None known.

5.2 Special hazards arising from the substance or mixture

Special Hazard Heating of containers may cause pressure rise, with risk of bursting. Thermal decomposition can lead to release of irritating and toxic gases and vapours: Nitrogen oxides (NO_x), Contact with metals may evolve flammable hydrogen gas.

5.3 Advice for firefighters

Fire fighting measures Evacuate non-essential personnel.

Special protective equipment for fire-fighters Wear self-contained breathing apparatus and protective suit.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation. Evacuate non-essential personnel. Avoid contact with skin, eyes and clothing. Avoid breathing vapours or mists. Do not touch or walk through spilled material. In case of insufficient ventilation, wear suitable respiratory equipment.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Prevent entry into waterways, sewers, basements or confined areas. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

The product should not be allowed to enter drains, water courses or the soil. The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or calcium hydroxide. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections

See sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Avoid breathing vapours or mists. Contact lenses should not be worn when working with this product. Wash hands thoroughly after handling. Do not eat, drink and smoke in work areas; wash hands after use; remove contaminated clothing and protective equipment before entering eating areas. See annex for more detailed information.

7.2 Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Keep in properly labelled containers. Keep container tightly closed. Keep in a dry, cool and well-ventilated place Store locked up. Keep away from direct sunlight, Incompatible Materials: Steel, copper, Aluminium, Alkalis.
Packaging: corrosive resistant stainless steel, Glass, PVC, PTFE .

7.3 Specific end use(s)

Exposure scenario See annex.

Other information Not available.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Chemical name	European Union	The United Kingdom	France	Spain	Germany
Nitric acid	STEL: 1 ppm STEL: 2.6 mg/m³	STEL: 1 ppm STEL: 2.6 mg/m³	STEL: 1 ppm STEL: 2.6 mg/m³	VLA-EC: 1 ppm VLA-EC: 2.6 mg/m³	STEL: 1 ppm STEL: 2.6 mg/m³

Chemical name	Italy	Portugal	Netherlands	Denmark	Poland
Nitric acid	STEL: 1 ppm SETL: 2.6 mg/m³		STEL: 1.3 mg/m³	STEL: 5 mg/m³ TWA: 10 mg/m³	NDSCh: 2.6 mg/m³ NDS: 1.4 mg/m³

Chemical name	Belgium	Sweden	Hungary	Finland	Czech Republic
Nitric acid	STEL: 2.6 mg/m³	STEL: 13 mg/m³ TWA: 5 mg/m³	STEL: 2.6 mg/m³	TWA: 0.5 ppm TWA: 1.3 mg/m³ STEL: 1 ppm STEL: 2.6 mg/m³	

Recommended monitoring procedures No information available.

Derived No Effect Level (DNEL)

Chemical name	Long-term exposure - Local effects - Inhalation	Long-term exposure - Local effects - Dermal	Acute / short-term exposure - Local effects - Inhalation	Acute / short-term exposure - Local effects - Dermal
Nitric acid	2.6 mg/m³ (worker) 1.3 mg/m³ (gen. population)			

Predicted No Effect Concentration (PNEC) No information available.

8.2 Exposure controls

Appropriate Engineering Controls Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Additional advice: Portable Diphoterine eyewashers. See annex for more detailed information.

Individual protection measures, such as personal protective equipment

Eye Protection Tightly fitting safety goggles.

Hand Protection Protective gloves: (EN 374), Fluorinated rubber FKM, Viton®, 0,4mm >8h .
Polychloropyrene (CR) , Butyl rubber, Polyvinylchloride (PVC), 0,5mm >=2h.
Unsuitable materials: Nitrile rubber, Natural Rubber.

Skin and body protection Wear suitable protective clothing: Chemical resistant apron, Boots.

Respiratory Protection Wear respiratory protection: Wear a positive-pressure supplied-air respirator or Full face mask.

Recommended Filter Type NO- P3, Color code: White - Blue.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Do not eat, drink or smoke when using this product.

Environmental exposure controls The product should not be allowed to enter drains, water courses or the soil.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state @20°C	
Appearance	fluid
Colour	Colourless / Brown
Odour	Pungent
Odour threshold	0.75 - 2.5 ppm
pH	< 1
Melting/freezing point	-35 to -18 °C
Boiling point/boiling range	104 - 122 °C
Flash point	Not applicable
Evaporation rate	No information available
Flammability (solid, gas)	Not flammable
Flammability Limits in Air	Not applicable
Vapour pressure	9.4-9.5 hPa, 55%-70% (@20 °C)
Vapour density	2.2 (air = 1)
Relative density	1.35 (water = 1)
Solubility	
Water solubility	Soluble, (Completely miscible)
Partition coefficient (n-octanol/water)	No information available
Autoignition temperature	Not applicable
Decomposition temperature	>200 °C
Viscosity, dynamic	0.75 mPa.s (@ 25°C) 100%
Explosive properties	No information available
Oxidising properties	See section 3.2

9.2 Other information

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Corrosive to Metals.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

The product reacts with metals with evolution of highly flammable hydrogen. Reacts with water: (exothermic reaction). Risk of explosion in confined areas and in contact with incompatible materials.

10.4 Conditions to avoid

Keep away from heat and sources of ignition.

10.5 Incompatible materials

Alkalis, Combustible materials, Organic materials, Alcohols, organic solvents, Ketones, Aldehydes, Amines, Strong alkalis, Halogens, Polypropylene and Carbon steel. Contact with metals may evolve flammable hydrogen gas. May intensify fire; oxidiser.

10.6 Hazardous decomposition products

Hydrogen gas, Nitrogen oxides (NO_x), Carbon oxides.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute Toxicity

Ingestion	Causes burns of the upper digestive and respiratory tracts by strong corrosion.
Skin Contact	Corrosive to skin. Corrosive to eyes.
Inhalation	Toxic if inhaled.

Chemical name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Nitric acid			> 2.65 mg/L (Rat) 4h

Skin Corrosion/Irritation	Corrosive to skin. Causes severe skin burns and eye damage.
Serious eye damage/irritation	Corrosive to eyes. Causes severe damage to eyes.
Respiratory or skin sensitisation	Based on available data, the classification criteria are not met.
Germ Cell Mutagenicity	Not known to cause heritable genetic damage.
Carcinogenicity	Contains no ingredient listed as a carcinogen.
Reproductive Toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus. Not known to adversely affect reproductive functions and organs.
STOT-single exposure	Corrosive to respiratory system.
STOT-repeated exposure	Based on available data, the classification criteria are not met.
Aspiration Hazard	Based on available data, the classification criteria are not met.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Based on available data, the classification criteria are not met.
May cause adverse effects in the aquatic environment due to changes in pH.

Chemical name	Toxicity to Algae	Toxicity to Fish	Toxicity to Micro-organisms	Toxicity to daphnia and other aquatic invertebrates
Nitric acid		Median lethal pH (96h) 3-3.5 (Lepomis macrochirus) Median lethal pH (96h) ca. 3.7 (Oncorhynchus mykiss)		Median lethal pH (48h) 4.4-4.7 (Ceriodaphnia dubia)

12.2 Persistence and degradability

Readily biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

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

12.6 Other adverse effects

May cause adverse effects in the aquatic environment due to changes in pH.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste from residues / unused products Dispose of in accordance with local regulations.

Contaminated Packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14: TRANSPORT INFORMATION

According to: ADR, RID, ADN, IMDG, IATA/ICAO.

14.1 UN number

UN 2031

14.2 UN proper shipping name

NITRIC ACID

14.3 Transport hazard class(es)

8

14.4 Packing group

II

14.5 Environmental hazards

Not applicable.

14.6 Special precautions for user

See transport regulations for UN number specific special precautions.
Inland waterway transport (ADN) PP 81: Shelf life Plastic container.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code

See section 17, IBC Code.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Restrictions on use	Dangerous substance category per Seveso Directive (2012/18/EU): H2. Quantity 1: 50t, Quantity 2: 200t.
Other Regulations	Regulation (EC) No. 98/2013 on the marketing and use of explosives precursors: Annex 1.

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out for this substance. See annex for more detailed information.

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3
H272 - May intensify fire; oxidiser
H290 - May be corrosive to metals
H314 - Causes severe skin burns and eye damage
H331 - Toxic if inhaled
EUH071 - Corrosive to the respiratory tract

Abbreviations and acronyms	STOT: Specific Target Organ Toxicity PBT: Persistent, Bioaccumulative, Toxic vPvB: very Persistent and very Bioaccumulating ADR: Accord européen relatif au transport international des marchandises Dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road) EC: European Commission RID: Règlement concernant le transport international ferroviaire des marchandises dangereuses (Regulations for the International Transport of Dangerous Goods by Rail) ADN: Accord européen relatif au transport international des marchandises Dangereuses par voies de Navigation intérieures (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways) ICAO: International Civil Aviation Organization REACH: Registration, Evaluation, Authorisation and Restriction of Chemical substances ES: Exposure Scenario DNEL: Derived No Effect Level PNEC: Predicted No Effect Concentration
Revision note	Format updated in compliance with European REACH and CLP regulations. Classification (1272/2008/EC).
Training Advice	Workers must be trained in the proper use and handling of this product as required under applicable regulations.
SDS No.	OC00019

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

1. EXPOSURE SCENARIO

Exposure scenario 1
Title **Manufacturing**

Use descriptor

Process categories

PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure (e.g. sampling)
PROC3 - Use in closed batch process (synthesis or formulation); Industrial setting
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC 8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing)
PROC15 - Use as laboratory reagent

Environmental release categories ERC1 - Manufacture of substances

2. CONDITIONS OF USE AFFECTING EXPOSURE

Product characteristics
Physical state @20°C Liquid, Aqueous solution.
Concentration of substance in product 60%.

Frequency and duration of use ≤ 8 hours/day.
Contributing scenarios

Control of environmental exposure	
Environmental Release Category	ERC1 - Manufacture of substances
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Control of environmental exposure	Not required

Control of worker exposure	
Process category	PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15 - Use as laboratory reagent
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Technical conditions and measures at process level (source) to prevent release	Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organisational measures: Minimise the number of staff in the working area. Minimise manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon

	austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene. Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour). Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place.
Conditions and Measures Related to Personal Protection, Hygiene, and Health Evaluation	General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory protection: In case there is any risk of inhalation exposure to the substance, always wear a full face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract. Dermal and eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166).Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage. When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit. Suitable material: butyl/fluorinated rubber.

3. EXPOSURE ESTIMATION AND REFERENCE TO ITS SOURCE

Environment Exposure Estimation	
Environment Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

Health Exposure Estimation	
Health Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

4. GUIDANCE TO DOWNSTREAM USER FOR EVALUATING EMPLOYEE WHETHER HE WORKS INSIDE THE BOUNDARIES SET BY THE ES

Environmental exposure

As no environmental hazard was identified no environmental-related exposure assessment and risk characterisation was performed.

Control of worker exposure

Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented.

Guidance to check compliance with the exposure scenario

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required. For scaling see ECETOC TRA, ART, STOFFENMANAGER, EUSES.

1. EXPOSURE SCENARIO

Exposure scenario 2
Title **Formulation [mixing] of preparations and/or re-packaging**

Use descriptor

Product category
PC12 - Fertilisers
PC14 - Metal surface treatment products, including galvanic and electroplating products
PC15 - Non-metal-surface treatment products
PC35 - Washing and cleaning products (including solvent based products)

Process categories
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure (e.g. sampling)
PROC3 - Use in closed batch process (synthesis or formulation); Industrial setting
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact)
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC 8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing)
PROC15 - Use as laboratory reagent

Environmental release categories ERC2 - Formulation of mixtures

2. CONDITIONS OF USE AFFECTING EXPOSURE

Product characteristics
Physical state @20°C Liquid, Aqueous solution.
Concentration of substance in product 60%.

Frequency and duration of use ≤ 8 hours/day.
Contributing scenarios

Control of environmental exposure	
Environmental Release Category	ERC2 - Formulation of mixtures
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Control of environmental exposure	Not required

Control of worker exposure	
Process category	PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact) PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15 - Use as laboratory reagent
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Technical conditions and measures at process level (source) to prevent release	Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not

	contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organisational measures: Minimise the number of staff in the working area. Minimise manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene. Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour). Local exhaust ventilation: Use indoor local exhaust ventilation when vapour/mist/spray of nitric acid could be present in the air within the breathing zone of a worker. Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place.
Conditions and Measures Related to Personal Protection, Hygiene, and Health Evaluation	General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory protection: In case there is any risk of inhalation exposure to the substance, always wear a full face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract. Dermal and eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166).Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage. When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit. Suitable material: butyl/fluorinated rubber.

3. EXPOSURE ESTIMATION AND REFERENCE TO ITS SOURCE

Environment Exposure Estimation	
Environment Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

Health Exposure Estimation	
Health Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

4. GUIDANCE TO DOWNSTREAM USER FOR EVALUATING EMPLOYEE WHETHER HE WORKS INSIDE THE BOUNDARIES SET BY THE ES

Environmental exposure

As no environmental hazard was identified no environmental-related exposure assessment and risk characterisation was performed.

Control of worker exposure

Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented.

Guidance to check compliance with the exposure scenario

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required. For scaling see ECETOC TRA, ART, STOFFENMANAGER, EUSES.

1. EXPOSURE SCENARIO

Exposure scenario 3
Title **Industrial use, Use as an intermediate.**

Use descriptor

Sector of use
SU8 - Manufacture of bulk, large scale chemicals (including petroleum products)
SU9 - Manufacture of fine chemicals
SU0 - Other

Product category
PC19 - Intermediates

Process categories
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure (e.g. sampling)
PROC3 - Use in closed batch process (synthesis or formulation); Industrial setting
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact)
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC 8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing)
PROC15 - Use as laboratory reagent

Environmental release categories
ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)

2. CONDITIONS OF USE AFFECTING EXPOSURE

Product characteristics
Physical state @20°C Liquid, Aqueous solution.
Concentration of substance in product 60%.

Frequency and duration of use ≤ 8 hours/day.
Contributing scenarios

Control of environmental exposure	
Environmental Release Category	ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Control of environmental exposure	Not required

Control of worker exposure	
Process category	PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact) PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15 - Use as laboratory reagent
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Technical conditions and measures at	Containment: Under standard operating conditions the substance is rigorously contained by

process level (source) to prevent release	technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organisational measures: Minimise the number of staff in the working area. Minimise manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene. Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour). Local exhaust ventilation: Use indoor local exhaust ventilation when vapour/mist/spray of nitric acid could be present in the air within the breathing zone of a worker. Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place.
Conditions and Measures Related to Personal Protection, Hygiene, and Health Evaluation	General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory protection: In case there is any risk of inhalation exposure to the substance, always wear a full face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract. Dermal and eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166).Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage. When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit. Suitable material: butyl/fluorinated rubber.

3. EXPOSURE ESTIMATION AND REFERENCE TO ITS SOURCE

Environment Exposure Estimation	
Environment Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

Health Exposure Estimation	
Health Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

4. GUIDANCE TO DOWNSTREAM USER FOR EVALUATING EMPLOYEE WHETHER HE WORKS INSIDE THE BOUNDARIES SET BY THE ES

Environmental exposure

As no environmental hazard was identified no environmental-related exposure assessment and risk characterisation was performed.

Control of worker exposure

Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented.

Guidance to check compliance with the exposure scenario

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required. For scaling see ECETOC TRA, ART, STOFFENMANAGER, EUSES.

1. EXPOSURE SCENARIO

Exposure scenario 4
Title **Industrial use, Industrial cleaning.**

Use descriptor

Sector of use
SU2a - Mining, (without offshore industries)
SU4 - Manufacture of food products
SU6a - Manufacture of wood and wood products
SU8 - Manufacture of bulk, large scale chemicals (including petroleum products)
SU9 - Manufacture of fine chemicals
SU10 - Formulation [mixing] of preparations and/or re-packaging
SU12 - Manufacture of plastics products, including compounding and conversion
SU14 - Manufacture of basic metals, including alloys
SU15 - Manufacture of fabricated metal products, except machinery and equipment
SU16 - Manufacture of computer, electronic and optical products, electrical equipment
SU19 - Building and construction work
SU23 - Recycling

Product category
PC0 - Other Products
PC14 - Metal surface treatment products, including galvanic and electroplating products
PC15 - Non-metal-surface treatment products
PC20 - Products such as pH-regulators, flocculants, precipitants, neutralization agents, other unspecific
PC35 - Washing and cleaning products (including solvent based products)
PC37 - Water treatment chemicals

Process categories
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure (e.g. sampling)
PROC3 - Use in closed batch process (synthesis or formulation); Industrial setting
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact)
PROC7 - Industrial spraying
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC 8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing)
PROC10 - Roller application or brushing
PROC13 - Treatment of articles by dipping and pouring
PROC15 - Use as laboratory reagent

Environmental release categories
ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
ERC6b - Industrial use of reactive processing aids

2. CONDITIONS OF USE AFFECTING EXPOSURE

Product characteristics
Physical state @20°C Liquid, Aqueous solution.
Concentration of substance in product 60%.

Frequency and duration of use ≤ 8 hours/day.
Contributing scenarios

Control of environmental exposure	
Environmental Release Category	ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles

	ERC6b - Industrial use of reactive processing aids
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Control of environmental exposure	Not required

Control of worker exposure	
Process category	PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact) PROC7 - Industrial spraying PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10 - Roller application or brushing PROC13 - Treatment of articles by dipping and pouring PROC15 - Use as laboratory reagent
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Technical conditions and measures at process level (source) to prevent release	Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organisational measures: Minimise the number of staff in the working area. Minimise manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene. Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour). Local exhaust ventilation: Use indoor local exhaust ventilation when vapour/mist/spray of nitric acid could be present in the air within the breathing zone of a worker. Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place.
Conditions and Measures Related to Personal Protection, Hygiene, and Health Evaluation	General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory protection: In case there is any risk of inhalation exposure to the substance, always wear a full face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract. Dermal and eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166).Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage. When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit. Suitable material: butyl/fluorinated rubber.

3. EXPOSURE ESTIMATION AND REFERENCE TO ITS SOURCE

Environment Exposure Estimation	
Environment Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

Health Exposure Estimation	
Health Exposure Estimation	Not available Quantitative exposure and risk assessment not available

4. GUIDANCE TO DOWNSTREAM USER FOR EVALUATING EMPLOYEE WHETHER HE

WORKS INSIDE THE BOUNDARIES SET BY THE ES

Environmental exposure

As no environmental hazard was identified no environmental-related exposure assessment and risk characterisation was performed.

Control of worker exposure

Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented.

Guidance to check compliance with the exposure scenario

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required. For scaling see ECETOC TRA, ART, STOFFENMANAGER, EUSES.

1. EXPOSURE SCENARIO

Exposure scenario 5
Title **Professional use, Professional cleaning.**

Use descriptor

Sector of use
SU1 - Agriculture, forestry, fishery
SU2a - Mining, (without offshore industries)
SU4 - Manufacture of food products
SU6a - Manufacture of wood and wood products
SU12 - Manufacture of plastics products, including compounding and conversion
SU14 - Manufacture of basic metals, including alloys
SU15 - Manufacture of fabricated metal products, except machinery and equipment
SU16 - Manufacture of computer, electronic and optical products, electrical equipment
SU19 - Building and construction work
SU23 - Recycling

Product category
PC12 - Fertilisers
PC14 - Metal surface treatment products, including galvanic and electroplating products
PC15 - Non-metal-surface treatment products
PC20 - Products such as pH-regulators, flocculants, precipitants, neutralization agents, other unspecific
PC35 - Washing and cleaning products (including solvent based products)

Process categories
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure (e.g. sampling)
PROC3 - Use in closed batch process (synthesis or formulation); Industrial setting
PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact)
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC 8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing)
PROC10 - Roller application or brushing
PROC11 - Non industrial spraying
PROC13 - Treatment of articles by dipping and pouring
PROC15 - Use as laboratory reagent
PROC19 - Hand-mixing with intimate contact and only PPE available

Environmental release categories
ERC8b - Wide dispersive indoor use of reactive substances in open systems
ERC8e - Wide dispersive outdoor use of reactive substances in open systems

2. CONDITIONS OF USE AFFECTING EXPOSURE

Product characteristics
Physical state @20°C Liquid, Aqueous solution.
Concentration of substance in product 60%.

Frequency and duration of use ≤ 8 hours/day.

Contributing scenarios

Control of environmental exposure	
Environmental Release Category	ERC8b - Wide dispersive indoor use of reactive substances in open systems ERC8e - Wide dispersive outdoor use of reactive substances in open systems
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Control of environmental exposure	Not required

Control of worker exposure	
Process category	PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multi-stage and/or significant contact) PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10 - Roller application or brushing PROC11 - Non industrial spraying PROC13 - Treatment of articles by dipping and pouring PROC15 - Use as laboratory reagent PROC19 - Hand-mixing with intimate contact and only PPE available
Product characteristics	Liquid
Frequency and duration of use	≤ 8 hours/day
Technical conditions and measures at process level (source) to prevent release	Containment: Under standard operating conditions the substance is rigorously contained by technical means in the working area. The activities take place in a standardized way, under controlled conditions with dedicated equipment. In case a certain amount of the substance is not contained, a worker is not exposed to the substance as the use takes place in a fume hood or as the worker wears personal protective equipment and uses local exhaust ventilation. Formation of aerosols/mists/splashes is prevented. Organisational measures: Minimise the number of staff in the working area. Minimise manual activities. Train employees how to safely handle the substance, incl. how to use personal protection equipment. Regularly clean up the working area. Have supervision in place to regularly check that the conditions of use are followed by the workers. Ensure that all equipment is well maintained. Ascertain that personal protection equipment is available and used according to the instructions. Ensure that eyewash stations and safety showers are available in the working area. Suitable material: The recommended material for tanks, vessels and accessories is low carbon austenitic stainless steel. Unsuitable materials: Do not use any metal, carbon steel or polypropylene. Ventilation conditions in the working area: Use only outdoors or in a well-ventilated area (approximately 5 air changes per hour). Local exhaust ventilation: Use indoor local exhaust ventilation when vapour/mist/spray of nitric acid could be present in the air within the breathing zone of a worker. Storage conditions: Store in a well-ventilated place (preferably outside). In an area equipped with acid resistant flooring. Protect from sunlight. Keep containers tightly closed. Keep away from combustible materials, heat, hot surfaces, sparks, open flames and other ignition sources. Gas monitoring: Use stationary and/or portable NOx monitors in the working place.
Conditions and Measures Related to Personal Protection, Hygiene, and Health Evaluation	General: Work under a high standard of personal hygiene. Wash hands and face before breaks. Do not eat, drink or smoke in the working area. Respiratory protection: In case there is any risk of inhalation exposure to the substance, always wear a full face mask with an acid gas cartridge or wear a supplied air respirator/helmet/suit. Potential inhalation exposure to the substance must be kept to a minimum. The smallest amount inhaled may already have (acute and/or delayed) effects on the respiratory tract. Dermal and eye protection: In case there is any risk of dermal exposure (via contaminated equipment), always wear suitable acid resistant protective clothing in the working area and wear acid resistant gloves conforming to EN374 (and chemical safety goggles/full-face shield conforming to EN166).Potential dermal exposure to the substance must be kept to a minimum. The smallest amount of an aqueous solution of the substance may already cause severe burns and/or eye damage. When aerosols/mists of nitric acid can be formed, wear a suitable acid resistant chemical safety suit with a supplied air respirator/helmet/suit. Suitable material: butyl/fluorinated rubber.

3. EXPOSURE ESTIMATION AND REFERENCE TO ITS SOURCE

Environment Exposure Estimation	
Environment Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

Health Exposure Estimation	
Health Exposure Estimation	Not determined Quantitative exposure and risk assessment not available

4. GUIDANCE TO DOWNSTREAM USER FOR EVALUATING EMPLOYEE WHETHER HE WORKS INSIDE THE BOUNDARIES SET BY THE ES

Environmental exposure

As no environmental hazard was identified no environmental-related exposure assessment and risk characterisation was performed.

Control of worker exposure

Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented.

Guidance to check compliance with the exposure scenario

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required. For scaling see ECETOC TRA, ART, STOFFENMANAGER, EUSES.

CONTAMINANT FACT SHEET

wood.

CONTAMINANT FACT SHEET

Chemical Name: Tetrachloroethene
CAS Number: 127-18-4
Synonyms: tetrachloroethylene; Perchloroethylene (Perc)

HEALTH HAZARD DATA

Color: colorless

Physical State: Solid ; Liquid X ; Gas

Odor: chloroform-like

Odor Threshold: 47 ppm

Vapor Density: 6.8 g/L

Ionization Potential (IP): 9.32 eV

IDLH: 150 ppm

Carcinogen: OSHA ; IARC ; NTP X ; ACGIH X ; NIOSH X

Skin absorbable: yes __ no X

Skin corrosive: yes __ no X

Signs/Symptoms of Acute Exposure:
Irritation of eyes, nose, and throat; nausea; flushing of the face and neck; vertigo; dizziness; incoherence; headache; sleepiness, and skin irritation

Source	TWA (units)	STEL (units)	C (units)
OSHA PEL	100 ppm		200 ppm
ACGIH TLVs	25 ppm	100 ppm	
NIOSH RELs	Lowest Feasible		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	RAE 10.6 eV	Isobutylene 100 ppm	1.58	9 ppm
PID	HNu 10.2 eV	Isobutylene 100 ppm	0.86	9 ppm
Detecor Tube	Drager 8101 501	2 - 40 ppm		12.5 ppm

Checked by: Amberlee Clark Date: 7/20/20

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Teflon, Viton, CPF3, Barricade, Responder, Trellchem, Tychem

Gloves: Viton, Teflon, and Polyvinyl Alcohol (do not use in (water)

Boots: Nitrile Rubber

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR=TWA x 10= 90 ppm
MUC Full-Face APR=TWA x 10= 90 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA / NA

Fire Extinguishing Media:
Dry Chemical X ; Foam X
Water Spray X ; CO_2 X

Incompatibilities:
Strong oxidizers, chemically-active metals, caustic soda, sodium hydroxide, and potash

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Trichloroethene

CAS Number: 67-64-1

Synonyms:

Ethylene trichloride, TCE

Trichloroethylene, Trilene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____ Liquid X ____ Gas ____

Odor: Chloroform-like

Odor Threshold 82 ppm

Vapor Density: 4.5 g/L

Ionization Potential (IP): 9.69 eV

IDLH: 1000 ppm

Carcinogen: OSHA ____ IARC ____ NTP ____ ACGIH ____ NIOSH X

Skin absorbable: NO

Skin corrosive: NO

Signs/Symptoms of Acute Exposure:

Irritant to eyes and skin, headache, nausea, vomiting, dermatitis, vertigo, visual disturbance, fatigue, giddiness, sleepiness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm		200 ppm
ACGIH TLVs	10 ppm	25 ppm	
NIOSH RELs	25 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	1.82	9.1 ppm
Detector Tube	Drager 6828541	2 – 50 ppm		5 ppm

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Viton, PE/EVAL, Tychem, Barricade, Trellchem, Teflon, Responder

Gloves Teflon, Viton, Polyvinyl Alcohol (do not use in water)

Boots Teflon, Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 91 ppm

-MUC Full-Face APR = TWA x *50 = 606 ppm

*If quantitative fit testing is conducted, otherwise, use protection factor of 10

FIRE/REACTIVITY DATA

Flash Point: Unknown

LEL/UEL: 8%/10.5%

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong caustics and alkalis, chemically-active metals (such as barium, lithium, sodium, magnesium, titanium, and beryllium)

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Cis -1,2-Dichloroethylene
CAS Number: 540-59-0
Synonyms:
Acetylene dichloride,
cis -Acetylene dichloride,
trans-Acetylene dichloride,

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ___ Liquid X Gas ___

Odor: Chloroform-like

Odor Threshold: 0.08-17 ppm

Vapor Density: 3.35 g/L

Ionization Potential (IP): 9.65 eV

IDLH: 1000 ppm

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH ___

Skin absorbable: yes ___ no X

Skin corrosive: yes ___ no X

Signs/Symptoms of Acute Exposure:
Irritant to eyes and respiratory system, CNS, depression

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	200 ppm		
ACGIH TLVs	200 ppm		
NIOSH RELs	200 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6eV	Isobutylene 100 ppm	1.25	125 ppm

Checked by: Amberlee Clark Date: 7/20/20

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Teflon, Viton, PE/EVAL, Barricade, CPF3, Tychem Responder

Gloves: Viton, Teflon, Polyvinyl Alcohol (do not use in water)

Boots: Teflon, Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 1000 ppm
MUC Full-Face APR = TWA x 10 = 1000 ppm

FIRE/REACTIVITY DATA

Flash Point: 36-39 ° F

LEL/UEL: 5.6% / 12.8%

Fire Extinguishing Media:

Dry Chemical	X	Foam	X
Water Spray	X	CO_2	X

Incompatibilities:
Strong oxidizers, strong alkalis, potassium hydroxide, copper

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminant exists. Professional judgement and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

CONTAMINANT FACT SHEET

Chemical Name:
Vinyl Chloride

CAS Number: 75-01-4

Synonyms:
Chloroethene, chloroethylene, ethylene monochloride, VC, monochloroethene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ___
Liquid X below 7^0 F
Gas X

Odor: pleasant

Odor Threshold: 10-20 ppm

Vapor Density: 2.15 g/L
Vapor Pressure 3.3 atm
Ionization Potential (IP): 9.99 eV

IDLH: Not Determined

Carcinogen: OSHA X
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: yes ___ no X
Skin corrosive: yes ___ no X

Signs/Symptoms of Acute Exposure:
Weakness, abdominal pain, frostbite paleness or blueness of extremeties

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1.0 ppm		5.0 ppm
ACGIH TLVs	1.0 ppm		
NIOSH RELs	Lowest Feasible		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	10.6eV	Isobutylene 100 ppm	0.51	0.5 ppm*
PID	HNu 10.2eV	Isobutylene 100 ppm	0.32	0.32 ppm*
PID	HNu 11.7 eV	Isobutylene 100 ppm	0.78	0.78 ppm*
Detector Tube	Drager 6728061	0.5 - 3 ppm		0.5 ppm

Checked by: Cindy Sundquist Date: 4/19/10

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Tychem, Teflon
Gloves Teflon, Tychem
Nitrile Rubber
Boots Nitrile Rubber, Teflon

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 = N/A*
MUC Full-Face APR = TWA x 10 = N/A*

* Upgrade to Level B ppe. No Level C.

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: 3.6% / 33%

Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Copper, oxidizers, aluminum, peroxides, iron, steel (polymerizes in air, sunlight, or heat unless stabilized by inhibitors). Attacks iron and steel in presence of moisture.

2003 by MACTEC Engineering & Consulting, Inc.

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminant exists. Professional judgement and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
1,2,4 Trimethylbenzene
CAS Number: 95-63-6
Synonyms:
psi-Cumeme, Pseudodocumene
asymmetrical trimethylbenzene

HEALTH HAZARD DATA

Color: clear, colorless

Physical State: Solid
Liquid X
Gas

Odor: distinctive, aromatic

Odor Threshold: 0.006 - 2.4 ppm

Vapor Density: 4.2
Vapor Pressure: 1 mm Hg @ 56° I
Ionization Potential (IP): 8.27 eV

IDLH: N.D.

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH

Skin absorbable: Yes
Skin corrosive: No

Signs/Symptoms of Acute Exposure:
Irritates eyes, skin, nose, throat and respiratory system. Causes bronchitis, anemia, headaches drowsiness, lassitude, dizziness, nausia, vomiting confusion, chemical pneumonia.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs			
ACGIH TLVs	25 ppm		
NIOSH RELs	25 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6eV	Isobutylene 100 ppm	0.86	10 ppm*
PID	Hnu 10.2 eV	Isobutylene 100 ppm		10 ppm*
FID	Foxboro OVA 128	Methane	0.63	

* when PID calibrated to read benzene equivalent.

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits: Tychem responder - pure chem
Polycoated - ppm/ppb

Gloves: Nitrile, neoprene

Boots: Tychem, neoprene

Service Limit Concentration (ppm): 100 ppm*

MUC 1/2 Mask APR = TWA x 10 = 100 ppm*
MUC Full-Face APR = TWA x 10 = 100 ppm*
*Action limit as read on PID calibrated to read 1:1 benzene

FIRE/REACTIVITY DATA

Flash Point: 112° F

LEL/UEL: 0.9% - 6.4%

Fire Extinguishing Media:
Dry Chemical Foam
Water Spray CO_2

Incompatibilities:
Oxidizers, Nitric Acid

2003 by MACTEC Engineering & Consulting, Inc.

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Stoddard solvent
CAS Number: 8052-41-3
Synonyms:
Mineral spirits, White spirits

HEALTH HAZARD DATA

Color: Clear

Physical State: Solid ___ Liquid X Gas ___

Odor: kerosine-like

Odor Threshold: NA

Vapor Density: 4.0
Vapor Pressure 2 mm Hg
Ionization Potential (IP): UNK

IDLH: 20000mg/m3

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH ___

Skin absorbable: Yes X No ___
Skin corrosive: Yes ___ No X

Signs/Symptoms of Acute Exposure:
Eye and skin irritation, ingestion may cause irritation of digestive tract. May be harmful if swallowed. May cause lung damage. Inhalation: May cause respiratory tract irritation. May cause lung damage. Prolonged and repeated skin contact may cause dermatitis.

Source Fischer Scientific MSDS	TWA (units) ppm	STEL (units) ppm	C (units) ppm
OSHA PELs	500		
ACGIH TLVs	100		
NIOSH RELs	350 mg/m3		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID with 10.2 - 10.6 eV lamp	Any	100 ppm isobutylene		
Dust Meter		Factory		**
**Action limit will be based on soil concentrations. Contact C. Sundquist for action limits				

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits: poly coated tyvek
Gloves: viton, vinyl, nitrile, neoprene to prevent direct contact
Boots: nitrile, neoprene

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 =
MUC Full-Face APR = TWA x 10 =

FIRE/REACTIVITY/FIRST AID DATA

Flash Point: >38 ºC

LEL/UEL: 1%/7.5%

Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray ___ CO_2 X

Incompatibilities:

First Aid: Eyes - flush with water 15 min. Skin - flush with water Ingestion - Get medicle aid, do not induce vomiting. Inhalation- remove to fresh air, give 02 if breathing difficulty get medical aid.

2013 by AMEC Environment & Infrastructure, Inc.

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

NE = None Established
NA = Not Applicable/Not Available
Abs = Skin Absorption
Ing = Ingestion
Inh = Inhalation
Con = Skin and/or Eye contact

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Perfluoro-n-Octanoic Acid (PFOA)
CAS Number: 864071-09-0
Synonyms: PENTADECAFLUORO-N-OCTANOIC ACID-1; $CF_3(CF_2)_6\ ^{13}COOH$; PERFLUOROCTANOIC ACID-1

HEALTH HAZARD DATA

Color: white to off white powder
Physical State: Solid X / Liquid / Gas
Corrosive, toxic.
Odor: NA
Odor Threshold: NA
Vapor Density:
Vapor Pressure 0.52 mmHg @ 25 °C
Ionization Potential (IP) NA
IDLH: NA
Route of Entry: oral, inhale, dermal, eye

Carcinogen: OSHA / IARC / NTP / ACGIH / NIOSH
Skin absorbabl Yes X No
Skin corrosive: Yes X No

Signs/Symptoms of Acute Exposure:
Inhalation may cause spasm, chemical pneumonitis, and pulmonary edema. Symptoms of exposure include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and The best of our knowledge, the chemical, physical, mucous membranes, upper resp tract, eyes, and sk

Source	TWA (units) mg/m^3	STEL (units) ppm	C (units) ppm
OSHA PELs	NA		
ACGIH TLVs	NA		
NIOSH RELs	NA		
DFG MAKs	0.005 Skin		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Personal Sampling				
**Dust meter - Action limit will be based on soil concentrations. Contact C. Sundquist for action limits				**

Checked by: Cindy Sundquist Date: 9/30/2014

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits: Polycoated
Gloves: Rubber
Boots: Rubber

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 = 0.005 mg/m3
MUC Full-Face APR = TWA x 10 = 0.005 mg/m3

FIRE/REACTIVITY/FIRST AID DATA

Flash Point: NA
LEL/UEL: NA

Fire Extinguishing Media:
Dry Chemical X / Foam X
Water Spray X / CO_2 X

Incompatibilities: Bases, oxidizing agents, reducing agents.

First Aid: Oral exp - If swallowed and awake wash out mouth w/water. Inh exp - provide fresh air. If not breathing, provide CPR. If breathing is difficult, give oxygen. Derm/eye exp - Flush with water for 15 minutes. Rmv contam clothes and shoes. Call Dr..

2011 by AMEC Environment & Infrastructure

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

NE = None Established
NA = Not Applicable/Not Available
Abs = Skin Absorption
Ing = Ingestion
Inh = Inhalation
Con = Skin and/or Eye contact

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Perfluorooctane Sulfonate (PFOS)
CAS Number: 1763-23-1
Synonyms: Perfluorooctylsulfonic acid; Perfluorooctane sulfonic acid; PFOS; 1-Perfluorooctanesulfonic acid; Heptadecafluoro-1-octanesulfonic acid;

HEALTH HAZARD DATA

Color: White to yellowish crystalline powder
Physical State: Solid X / Liquid / Gas
Corrosive, toxic.
Odor: NA
Odor Threshold: NA
Vapor Density:
Vapor Pressure NA
Ionization Potential (IP NA
IDLH: NA
Route of Entry: oral, inh, dermal, eye

Carcinogen: OSHA / IARC / NTP / ACGIH / NIOSH
Skin absorbabl Yes / No
Skin corrosive: Yes X / No

Signs/Symptoms of Acute Exposure:
Causes burns to skin and eyes. Moisture sensitive. Corrosive. Harmful if swallowed. May cause severe and permanent damage to the digestive and respiratory tract. Causes gastrointestinal tract burns.

Source	TWA (units) mg/m^3	STEL (units) ppm	C (units) ppm
OSHA PELs	NA		
ACGIH TLVs	NA		
NIOSH RELs	NA		
DFG MAKs	0.01 Skin		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Personal Sampling				
**Dust meter - Action limit will be based on soil concentrations. Contact C. Sundquist for action limits				**

Checked by: Cindy Sundquist Date: 9/30/2014

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits: Polycoated
Gloves: Rubber
Boots: Rubber

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 = 0.1 mg/m3
MUC Full-Face APR = TWA x 10 = 0.1 mg/m3

FIRE/REACTIVITY/FIRST AID DATA

Flash Point: NA
LEL/UEL: NA

Fire Extinguishing Media:
Dry Chemical NA / Foam NA
Water Spray NA / CO_2 NA

Incompatibilities: Strong oxidizing agents. Strong acids.

First Aid: NA

2011 by AMEC Environment & Infrastructure

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

NE = None Established
NA = Not Applicable/Not Available
Abs = Skin Absorption
Ing = Ingestion
Inh = Inhalation
Con = Skin and/or Eye contact

GROUND DISTURBANCE INCIDENT REPORT

AMEC Environment & Infrastructure

Section 1 – General Information

Employee Name: _____ Time of incident: _____ ☐ am | ☐ pm Time Reported:_____ ☐ am | ☐ pm Report Date: _____

Project Name: _____ Project Number: _____ Client: _____

List of All Parties Present

Name	Company	Telephone No.	Role

Describe the chronological description of Incident and response:_____

Section 2 – Date and Location of Event

A. *Date of Event: (MM/DD/YYYY)

B. ***Country** ***State** ***County** **City**

C. **Street address** **Nearest Intersection**

D. *Right of Way where event occurred

E. Public: ☐ City Street ☐ State Highway ☐ County Road ☐ Interstate Highway ☐ Public-Other

F. Private: ☐ Private Business ☐ Private Land Owner ☐ Private Easement

G. ☐ Pipeline ☐ Power /Transmission Line ☐ Dedicated Public Utility Easement

☐ Federal Land ☐ Railroad ☐ Data not collected ☐ Unknown/Other

List attached documentation (Public Utility Locates, Private Utility Locates, Copy of notifications submitted to Owner or other utility Owners, photographs): _____

Section 3 – Affected Facility Information

***What type of facility operation was affected?**

☐ Cable Television ☐ Electric ☐ Natural Gas ☐ Liquid Pipeline ☐ Sewer (Sanitary Sewer)

☐ Steam ☐ Telecommunications ☐ Water ☐ Unknown/Other

***What type of facility was affected?**

☐ Distribution ☐ Gathering ☐ Service/Drop ☐ Transmission ☐ Unknown/Other

Was the facility part of a joint trench?

☐ Unknown ☐ Yes ☐ No

Was the facility owner a member of One-Call Center?

☐ Unknown ☐ Yes ☐ No

Section 4 – Excavation Information

***Type of Excavator**

☐ Contractor ☐ County ☐ Developer ☐ Farmer ☐ Municipality ☐ Occupant
☐ Railroad ☐ State ☐ Utility ☐ Data not collected ☐ Unknown/Other

***Type of Excavation Equipment**

☐ Auger ☐ Backhoe/Trackhoe ☐ Boring ☐ Drilling ☐ Directional Drilling
☐ Explosives ☐ Farm Equipment ☐ Grader/Scraper ☐ Hand Tools ☐ Milling Equipment
☐ Probing Device ☐ Trencher ☐ Vacuum Equipment ☐ Data Not Collected ☐ Unknown/Other

***Type of Work Performed**

☐ Agriculture ☐ Cable Television ☐ Curb/Sidewalk ☐ Bldg. Construction ☐ Bldg. Demolition
☐ Drainage ☐ Driveway ☐ Electric ☐ Engineering/Survey ☐ Fencing
☐ Grading ☐ Irrigation ☐ Landscaping ☐ Liquid Pipeline ☐ Milling
☐ Natural Gas ☐ Pole ☐ Public Transit Auth. ☐ Railroad Maint. ☐ Road Work
☐ Sewer (San/Storm) ☐ Site Development ☐ Steam ☐ Storm Drain/Culvert ☐ Street Light
☐ Telecommunication ☐ Traffic Signal ☐ Traffic Sign ☐ Water ☐ Waterway Improvement
☐ Data Not Collected ☐ Unknown/Other

Section 5 – Pre-Excavation Notification

***Was the One-Call Center notified?**

☐ Yes ☐ No If Yes, which One-Call Center? Ticket number:

Was Private Contract Locator used?

☐ Yes ☐ No

Section 6 – Locating and Marking

***Type of Locator**

☐ Utility Owner ☐ Contract Locator ☐ Data Not Collected

***Were facility marks visible in the area of excavation?**

☐ Yes ☐ No ☐ Data Not Collected

***Were facilities marked correctly?**

☐ Yes ☐ No ☐ Data Not Collected

What technology was used to locate utilities?

☐ Maps ☐ Active(transmitter+receiver) ☐ Passive (receiver only) ☐ GPR
☐ Acoustic ☐ Magnetic ☐ Infrared ☐ Unknown/Other

What Factors affected the ability to locate services?

☐ Soil Type:_____ ☐ Non-Grounded ☐ Common Bonded ☐ Depth
☐ Electromagnetic interference ☐ Parallel facilities ☐ Congested facilities ☐ Unknown/Other

Section 7 – Excavator Downtime

Did Excavator incur down time?

☐ Yes ☐ No

If yes, how much time?

☐ Unknown ☐ Less than 1 hour ☐ 1 hour ☐ 2 hours ☐ 3 or more hours Exact Value _____If

Estimated cost of down time?

☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5,001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value _____

Section 8 – Description of Damage

***Was there damage to a facility?**
☐ Yes ☐ No (i.e. near miss)
***Did the damage cause an interruption in service?**
☐ Yes ☐ No ☐ Data Not Collected ☐ Unknown/Other
If yes, duration of interruption
☐ Unknown ☐ Less than 1 hour ☐ 1 to 2 hrs ☐ 2 to 4 hrs ☐ 4 to 8 hrs ☐ 8 to 12 hrs ☐ 12 to 24 hrs
☐ 1 to 2 days ☐ 2 to 3 days ☐ 3 or more days ☐ Data Not Collected Exact Value _____
Approximately how many customers were affected?
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 10 ☐ 11 to 50 ☐ 51 or more Exact Value _____
Estimated cost of damage / repair/restoration
☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5,001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value _____
Number of people injured
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____
Number of fatalities
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____

Was there a Product Release?
Product Release: ☐ No ☐ Yes ☐ N/A Type: ____ **If Yes, Incident Type is Environmental Report.**
Volume: ____ Spill Controls: ____
Repair Process: ____

Section 9 – Description of the Root Cause

Please choose one

One-Call Notification Practices Not Sufficient
☐ No notification made to the One-Call Center
☐ Notification to one-call center made, but not sufficient
☐ Wrong information provided to One Call Center

Locating Practices Not Sufficient
☐ Facility could not be found or located
☐ Facility marking or location not sufficient
☐ Facility was not located or marked
☐ Incorrect facility records/maps

Excavation Practices Not Sufficient
☐ Failure to maintain marks
☐ Failure to support exposed facilities
☐ Failure to use hand tools where required
☐ Failure to test-hole (pot-hole)
☐ Improper backfilling practices
☐ Failure to maintain clearance
☐ Other insufficient excavation practices

Miscellaneous Root Causes
☐ One-Call Center error
☐ Abandoned facility
☐ Deteriorated facility
☐ Previous damage
☐ Data Not Collected
☐ Other

Section 10 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

One Call was called ☐ **Spills Reporting Agency Notified** ☐

Emergency Responders (Fire) was called ☐ **Post-incident Drug/Alcohol Testing Performed**

List of All Agencies Contacted

Name/Agency	Phone #	Date	Time

Incident Report prepared by: ____

Employee (s): ____	Date: ____	Employee's Supervisor: ____	Date: ____
HSE Coordinator/Project/Unit Manager: ____	Date: ____	Group HSE Manager:____	Date: ____

Check one
Initial Report: ☐
Update: ☐
Final Report: ☐ ____

INCIDENT ANALYSIS REPORT

AMEC Environment & Infrastructure
Confidential - Privileged

Incident Potential
Letter: Select One
Number: Select One
Investigation Level: Select One

Group: Select One HSE Manager: ____ Incident Review Panel Team (if applicable): ____

Incident Date: _____ Report Date: _____

Section 1 – General Information

Employee Name: ____ Sex: ☐ M ☐ F Date of Birth: ____ Age Range: Select One Time of incident: ____ ☐ am | ☐ pm

Job Position: Select One Hire Date: ____ Time employee began work: _____

Business Line: Select One Department Number: ____ Project Manager: ____

Project Name: ____ Project Number: ____ Client: ____

Office where employee works from: ____ Immediate Supervisor: ____ Hours employee worked during last 7 days: ____ hrs

Location: Select One Is this a Company controlled work site: ☐ Yes ☐ Incident Assigned to: Select One

Location description: ____

Section 2 – Incident Type - Process (**mark at least ONE BOLD TYPE** and all that apply)

☐ **Fatality** ☐ **Environmental** ☐ **Injury/Illness Incident** If Injury/illness: Select One
☐ **Security** ☐ **Near Miss / Hazard ID** ☐ **Property Damage** If Damage: Select One ☐ 3rd Party?
☐ Hospitalization ☐ Regulatory Inspection ☐ Notice of Violation or Citation ☐ Agency Reportable?
☐ Motor Vehicle Incident Involving Injury ☐ Other (describe): ____

Outcome/Result: Select One Source of Hazard: Select One If "other", specify: ____ Immediate Cause: Select One

A. If **injury/illness**: Indicate the part of the body: Select One If "other", specify: ____
Indicate body part location: Select One If "other", specify: ____
Injury Type: Select One If "other", specify: ____ Illness Type: Select One If "other", specify: ____
B. If **property damage**: describe what happened and estimate ($) of damage to all objects involved? ____
C. If **environmental**: Type of Environmental incident?: Select One Name, CAS#, physical state and quantity? ____
Receiving Environment?: Select One Mechanism of Incident?: Select One If "other", specify: ____
Nature of Breach?: Select One Duration of Breach?: Select One
D. If **security**: Security Incident Type: Select One If Physical: Select One If Criminal: Select One If Intellectual: Select One
E. If an **inspection by a regulatory agency**, what agency, who were the inspectors, inspector contact information? ____

Section 3 – Incident Description

Attach and number additional pages, as needed, to ensure all details related to the incident are captured.

A. List the names of all persons involved in the incident, and employer information: ____
B. List the names of any witnesses, their employer, and a local/company telephone number or address: ____
C. Name of Employee's supervisor: ____ Contact phone number for supervisor: ____
D. What specific job/task or action was the employee(s) doing just prior to the incident: ____
E. Was a tool or equipment involved? ☐ Yes ☐ No What was it: ____ Last Inspection Date: ____Defects: ____
F. Explain in **detail** what happened: ____
G. Explain in **detail** what object or substance directly harmed the employee: ____

H. What were the weather conditions at time of incident?: ___

I. What was the lighting like at time of incident? Bright ☐ Shadows ☐ Dark ☐ Other: ___

J. List any damaged equipment or property (other than motor vehicles). Provide model and serial number **and** estimated costs to repair/replace damaged equipment or property, if applicable: ___

Section 4 - Incident Analysis

A. Was a Health and Safety Plan (HASP) or Activity Hazard Analysis (AHA) completed for the work being performed? ☐ Yes ☐ No
If "yes", Who prepared the document?: ___

B. Who and when was the last manager (Project, Unit, etc.) at the site of the incident?: ___

C. When and what safety training **directly related** to the incident has the person(s) involved had?: ___

D. List attached documentation (HASP acknowledgement forms, kickoff/daily/weekly meetings, inspections, photographs): ___

Section 5 - Incident Investigation Results and Corrective Actions

This section to be completed by the Group HSE Manager/IRP with support from location where incident occurred.

Causal Factors (Acts or Omissions / Conditions)

(Attach and number any additional pages as needed to completely address this section)

	IMMEDIATE CAUSE	IMMEDIATE CAUSE SUB-TYPE	DESCRIPTION
1	Select One	_____	_____
2	Select One	_____	_____
3	Select One	_____	_____
4	Select One	_____	_____

Root Cause(s) Analysis - The below items represents major root cause categories which have been determined to be Less Than Adequate (LTA). A more detailed determination of the root cause will be facilitated, if needed, by the applicable Group HSE Manager / IRP.

	ROOT CAUSE TYPE	ROOT CAUSE SUB-TYPE	DESCRIPTION
1	Select One	_____	_____
2	Select One	_____	_____
3	Select One	_____	_____
4	Select One	_____	_____

Corrective Actions

Root Cause #	Corrective Actions Taken (Attach additional pages as needed to completely address this section)	Responsible Person	Proposed Completion Date	Closed on Date	Verified by and Date Verified
_____	___	___	___	___	___
_____	___	___	___	___	___
_____	___	___	___	___	___
_____	___	___	___	___	___
_____	___	___	___	___	___

Section 6 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

Auto Insurance Carrier was called ☐ **Group HSE Manager Notified** ☐

WorkCare was called ☐ **Post-incident Drug/Alcohol Testing Performed** ☐

Incident Report prepared by: ___

Employee (s): ___	Date: ___	Employee's Supervisor: ___	Date: ___
HSE Coordinator/Project/Unit Manager: ___	Date: ___	Group HSE Manager:___	Date: ___

VEHICLE INCIDENT REPORT (VIR)

Wood E&IS

Confidential - Privileged

Section 1 - General Information

Date of Incident: _____

Time incident occurred: _____ ☐ am | ☐ pm | Illumination: ☐ Dark ☐ Dusk ☐ Light | Road Condition: ☐ Dry ☐ Wet ☐ Icy/snow

Were police summoned to scene? ☐ Yes ☐ No Police Department and Location: _____

Report #; _____ Officer's Name: _____ Officer's Badge Number: _____

Section 2 - Company Driver and Vehicle

Driver's name: _____ D/L #: _____ State: _____

Driver's home office address: _____ Driver's Phone #: _____

Company Vehicle #: _____ Year: _____ Model: _____ License #: _____ State: _____

Company car?: ☐ Yes ☐ No Personal Vehicle?: ☐ Yes ☐ No Rental Vehicle?: ☐ Yes ☐ No

If rental, rented from: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage to vehicle: _____

Was an employee injured?: ☐ Yes ☐ No If yes, please describe: _____

Injuries to others?: ☐ Yes ☐ No If yes, please describe: _____

Vehicle was being used for: Company business ☐ Yes ☐ No Personal business ☐ Yes ☐ No

Towed?: ☐ Yes ☐ No If yes, by whom?: _____ To Where?: _____

Section 3 - Other Driver and Vehicle Information

Driver's Name: _____ D/L # : _____ State: _____

Current address: _____ City: _____ State: _____

Telephone: _____ Work: _____ Cell: _____

Registered Owner's Name: _____ Address: _____ City: _____ State: _____

(verify registration document)

The Other Vehicle: Make: _____ Model: _____ Year: _____ License #: _____ State: _____

Insurance company name: _____ Address: _____ Phone #: _____

Policy No.: _____ Contact Person: _____ Phone #: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage: (*Make note of pre-existing damage and take pictures if possible – you may attach additional pages if necessary):* _____

Injuries to other driver/passengers: _____

Section 4 – Approvals (signatures required)

Form completed by (please print): _____ Date: _____

Signature: _____

Office/Project Manager (please print): _____ Date: _____

Signature: _____

Paper copies are uncontrolled. This copy was valid at the time it was printed. For an up-to-date copy, please visit OneSpace. © Wood 2018

Things to Do First In The Event Of a Motor Vehicle Incident

GENERAL INFORMATION

1. Do not decide on your own whether a particular incident is "covered" by insurance. Should there be any doubt, it is always preferable to report an occurrence, as this will allow Insurers/Group Insurance to determine if a covered loss has taken place.

2. Policy Conditions do require that all losses and occurrences, which may result in a claim be promptly reported.

3. Do not admit liability or offer your opinion on liability to anyone.

4. Complete this IAR/VIR form promptly and forward with all applicable supporting documentation. It is essential both division and location information be provided.

5. For automobile collisions within the **United States**, please indicate on the IAR form that you have contacted our Fleet Management Vendor, Donlen, at:

Donlen Hotline: 1-800-377-3192
Select Prompt "3" for accident management
24 hours a day, 7 days a week

6. For automobile collisions within **Canada**, please indicate on the IAR form that you have contacted the Control Adjuster and Group Insurance at:

Crawford Adjusters Canada - Claims Alert
1-888-218-2346
Email: newcrawfordclaims@crawco.ca
Copy: claims.insurance@woodgroup.com
Copy: amecfwinsurance@amecfw.com
24 hours a day, 7 days a week
Some provinces (BC, SK, MB) require incidents involving owned or leased vehicles also be reported to the Provincial Agency (Except for 1) Special lease agreements; 2) Third Party injury accidents; 3) Rented vehicles)

7. Information on the use of rental and personal vehicles at work and insurance are at the links for Canada and US.

The more details you have the better but, don't delay reporting if you don't have all of the information - that may be obtained later. A trained operator will answer your call and ask for all relevant information regarding the incident, and follow-up to obtain any additional information. The initial information required includes:

- Entity Name, Address & Location/Site Code – advise that you are a Wood company, E&IS
- Contact details of the person reporting the incident
- Wood vehicle details -i.e. license plate/serial number/make and model
- Injury details (if applicable)
- Driver & passenger details
- Date, location and circumstances of the accident
- Damage to your vehicle/Location of the vehicle/whether the vehicle is mobile or immobile
- Witness details
- The number of the Police Officer (if applicable) who is dealing with the incident and the name of his Police Station
- Details of the third party (if applicable) including
    a. Name, address and telephone number
    b. Vehicle details, License number, make and model
    c. Insurance company, policy number, address and telephone number.
    d. Name, address and telephone number of any passengers.
    e. Details of injuries/Hospital to which they have been taken. information (i.e., name, phone number, address, vehicle information, insurance information)

Call 911 if there are serious injuries!

If you are injured or think you were injured, **contact your supervisor and call WorkCare at 888-449-7787**. Your supervisor will notify your HSE Coordinator and your Group HSE Manager. For additional instructions on what to do, go to E&IS HSE website at:

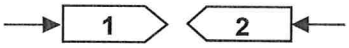
https://eiapps.amecfw.com/she/sheweb/incident_reporting.htm

1. **Call for an officer if the incident occurred on public property** (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable to attend the scene of the collision, a counter police report may be filed at most stations. Insurance companies rely on police reports to determine liability.
2. **Complete the Incident Investigation Report and the Vehicle Incident Report forms**. It is important that both these forms are completed in detail. Include a diagram of the incident on the provided sheet. Incomplete information may lead to delays in processing associated claims and in helping to prevent this type of incident from occurring again.
3. **Give only information that is required by the authorities or as directed by Wood** contractual requirements.
4. **Sign only those statements required by the authorities or as directed by Wood** contractual requirements. Do not sign away your or the company's rights.

Vehicle Incident Diagram

This or a similar diagram must be completed with all VIRs

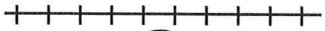
Instructions:

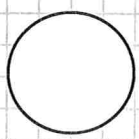
1. Number each vehicle and show directions 

2. Use a solid line to show path before incident and use a dotted line to show path after incient



(before) (after)

3. Show pedestrian/non-motorist by: 
4. Show railroad by 
5. Indicate north by arrow as: 
6. Show street or highway names or numbers
7. Show signs, signals, warning and traffic controls.



Indicate North by Arrow

Prepared by: _____ Date: _____

APPENDIX F – QAPP/SOPS

SOP # S2

STANDARD OPERATIONG PROCEDURE #S2

WATER LEVEL MEASUREMENT AND MONITORING WELL CONDITION EVALUATION PROCEDURES

April 20, 2020

NYSDEC Program QAPP – D009809

Revision 0

APPROVED:

Charles R Staples

_____	April 27, 2020
Charles Staples, PG, Program Technical Lead	Date
Review	Date
_____	_____
_____	_____
_____	_____

WATER LEVEL MEASUREMENT AND MONITORING WELL CONDITION EVALUATION PROCEDURES

1.0 PURPOSE

This Standard Operating Procedure (SOP) was prepared to direct field personnel in the methods for measuring water levels in and evaluating the condition of monitoring wells during field investigations at hazardous and non-hazardous waste sites. The objective of water level measurements is to gain accurate measurements (to within 0.01 feet [ft]) of the depth of ground water for use during well installation, use in preparation of groundwater elevation contour maps, slug tests, packer tests, and pumping tests.

Deviation from this procedure in planning or in the execution of planned activities must be approved by the project manager and documented in the field logbook and/or field data record.

2.0 PROCEDURE

2.1 Responsibilities

Project Manager

The project manager (PM) is responsible for determining the appropriate water level measurement procedures based on the sampling program objectives

Field Operations Lead

The field operations lead (FOL) is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The FOL is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to water level measurement activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or FOL and documenting the deviation in the field logbook and/or field data record.

2.2 Preparation

Office preparation

1. Review pertinent information with regards to well construction, development, and sampling information on the wells to be measured, if available.

2. Assemble appropriate logbooks and field data records to complete the field assignment.
3. Make copies of field data records with water level measurements and the description of monitoring well conditions from the previous sampling event, if available.

Equipment Selection and Sampling Considerations

The following list of equipment may be utilized during water level measurements. Site-specific conditions may warrant the use of additional or deletion of items from this list.

- Electronic water level indicators – graduated with an engineer's scale at 0.01 ft intervals
- Tap water or Deionized water
- Alconox®, Liquinox® or other non-phosphate concentrated laboratory grade soap
- Pump sprayer
- Pint sized squeeze bottles
- Any necessary personal protective equipment (gloves, eyewear, Tyvek® suits)
- Air monitoring instruments as required (PID or FID as specified in HASP)
- Field logbook
- Monitoring well inventory and/or water level field data records (FDRs) (site specific as needed)
- Well keys
- Previous measurement data (if available)
- Oil/water interface probe (if necessary)
- Engineer's rule
- Additional weight on tape if required

2.3 Field Procedures

Site-specific conditions may warrant the use of stringent air monitoring and potentially more significant decontamination scenarios.

- Record the condition of the well (protective casing, concrete collar, lock in place, etc.) on the FDR.
- Check that the water level tape has no obvious kinks or damage. If multiple water level meters are to be used, they should be checked for consistency by comparing readings from all meters used at one easily accessible monitoring well.
- Don appropriate PPE for the task and site conditions. Stand upwind of the well; unlock and open the well. If a vented cap is present, conduct well mouth air screening from the vent. If a non-vented well cap is present, remove the cap and screen the well mouth immediately. Record all

pertinent air monitoring results (sustained, dissipating, background, odor) on the FDR and in the field logbook.

- Identify the previous measuring point marking or notch on the riser or casing (if present). Record this location in the field logbook and on the FDR. It is important to always include the measuring point reference with the water level measurement (*e.g.* 7.15 feet below top of PVC riser [TOR]).
- Using a previously decontaminated water level indicator, turn on the meter, check the audible indicator, reel the electronic probe into the well riser (with the increments visible) slowly until the meter sounds, grasp the tape with hand, withdraw the tape and lower it again slowly until the sound is again audible. Check the depth to water on the tape and make a mental note of the depth to within 0.01 feet. Lower the probe again slowly and repeat the measurement for accuracy. If the measurement varies, repeat until a consistent measurement has been determined. It is not uncommon for a well to be under vacuum/pressure and for water in the well to rise or drop after the cap has been opened until the water reaches equilibrium with atmospheric pressure. A one-foot error is the most common measurement type during water level measurements. Be sure to read the depth correctly on the tape.
- Record the depth to water from the measuring point on the FDR. Make sure to include the measuring point reference with the water level measurement.
- Procedures utilized during water level measurements where free phase petroleum products are floating on the water table should be modified to include the use of the oil/water interface probe. The procedures during the use of this probe should be implemented similarly and by manufacturers' specifications. Using this type of probe, the thickness of the product can be determined.
- When measuring the depth to the bottom of the well, care must be taken to accurately determine the true depth to bottom as the graduated tape on a water level indicator will vary with manufacturer. At the start of the field program, using an engineer’s rule, measure from the 1-ft graduated mark on the tape to the 0-ft setpoint on the probe. For some manufactures (e.g. Heron Instruments) the 0-ft setpoint is the bottom of the probe and depth to bottom measurements can be directly recorded from the graduated tape. Pin style water level indicators (e.g. Solinst) typically have a 0-ft setpoint that is halfway up the metallic probe. For these style probes the offset from the bottom of the probe to the point of the pin must be measured and then added to depth to bottom measurements from the graduated tape.

Decontaminate the probe and tape. Refer to the **Field Equipment Decontamintion** for guidance.

3.0 ATTACHMENTS

Water Level Measurement and Monitoring Well Condition Field Data Record

SOP # S3

MACTEC STANDARD OPERATING PROCEDURE #S3

LOW FLOW GROUNDWATER SAMPLING PROCEDURES

April 20, 2020

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 0

APPROVED:

Charles R Staples

April 27, 2020

Charles Staples, PG, Program Technical Lead — Date

Reviewed — Date

_____ _____

_____ _____

_____ _____

LOW FLOW GROUNDWATER SAMPLING

1.0 PURPOSE

The following steps outline the purging and sample collection activities for low-flow sampling. Data will be recorded on the Low Flow Groundwater Field Data Record (FDR). Construction of monitoring wells may vary; therefore, this SOP may not be applicable to all situations.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure should be documented in the field logbook and/or field data record.

2.0 REFERENCES

U.S. Environmental Protection Agency (EPA), 2017. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from monitoring Wells (Revision 4). EQASOP-GW4. Effective date July 30, 1996, Revised September 19, 2017.

3.0 PROCEDURE

This section contains both the responsibilities and procedures involved with sampling environmental monitoring wells. Proper procedures are necessary to ensure the quality and integrity of the samples.

3.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures based on the sampling objectives.

Field Operations Lead

The field operations lead (FOL) is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The FOL is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or FOL and documenting the deviation in the field logbook.

3.2 Preparation

Office Preparation

- Review pertinent information with regards to well construction, development, and sampling information on the wells to be tested, if available.
- Determine target depth for location of the pump intake. Target depth should be the portion of the screened interval that intersects the zone of highest K. If the zone of highest K is unknown, or if the screen is placed within homogenous material, then the target depth shall be the midpoint of the saturated screen length. Primary flow zones should be identified in wells with screen lengths longer than 10 ft.
- Assemble appropriate logbooks and field data records to complete the field assignment.
- Make copies of field data records from the last sampling event.

Equipment Selection

Sampling pumps and water quality probes may vary depending on the well diameter, groundwater constituents and depth to groundwater, but generally, sampling will consist of the following equipment:

- Pump (e.g., peristaltic, bladder, submersible, or inertial) capable of a flow rate between 50 and 500 ml/minute and appropriate power supply. The pump type will principally depend on the depth to water and well diameter. Peristaltic pumps are effective only for wells where the depth to water is less than about 25 ft. Bladder pumps and submersible pumps are most commonly used for wells with depths to water greater than 25 ft. Inertial pumps are only recommended for narrow diameter wells that cannot be sampled using a bladder or peristaltic pump.
- Water quality parameter probes and flow-through cell (e.g., YSI) for measuring pH, temperature, conductivity (and/or specific conductance), dissolved oxygen (DO) and oxidation/reduction potential (ORP) of groundwater
- Turbidity meter (e.g. Hach)
- Calibration solutions for the water quality parameter probes
- Graduated water level indicator (accurate to 0.01 ft)
- Tubing, connections and tools as appropriate
- Graduated cylinder
- Watch or stopwatch
- Purge water container (e.g. 5-gallon bucket or carboy)
- Low flow groundwater sampling record (**example Attached**)
- Personal protection equipment (PPE)
- Decontamination supplies (e.g., DI water, Liquinox® soap, paper towels)
- Sample containers and cooler (provided by the laboratory)

- Ice for sample preservation
- Clean plastic sheeting
- Paper towels.

3.3 Field Procedures

Water quality parameter measurements shall be made using instrumentation and a flow through cell. Water quality parameter instruments will be calibrated daily as per the manufacturer's instructions. Equipment information (make, model, and serial number) and calibration readings shall be recorded on the field instrument calibration record (**example attached**).

Sampling will be conducted using the following procedure:

1. Don appropriate PPE.
2. Measure and record the depth to water and depth to the bottom of the well. Care should be taken to minimize disturbance of the water column within the well during pre-sample measurements.
3. If a submersible pump is used, decontaminate pump prior to use (if pumps are dedicated then this applies to the initial effort only) (**Equipment Decontamination SOP Table A-1**). Attach appropriate length of dedicated tubing or mark the tubing at the appropriate point so that when the pump and tubing are lowered into the well, and the mark is at the top of the well riser, the pump will be located at the target depth within the screened interval.
4. Carefully lower the pump to the predetermined target depth. Start the pump at a purge rate low enough to achieve 0.3 ft of drawdown or less based on historical data. If sampling the well for the first time, start the pump at the lowest possible setting (or approximately 100-ml per minute) and slowly increase the speed until discharge occurs. Check water level. Adjust pump speed until there is little (i.e., less than 0.3 ft) or no drawdown, if possible. If stabilized drawdown cannot be achieved, use the no-purge method described later in this section.
5. Monitor and record pumping rate and water levels every 3 to 5 minutes (or as appropriate) during purging. Appropriate measurement frequency may be calculated using the flow rate and the time required to purge a volume equivalent to that in the sample tubing and flow through cell. Record any adjustments to pumping rates on the FDR.
6. During purging and sampling the tubing should remain filled with water.
7. If there is visible turbidity in the discharge water, continue purging until the turbidity clears up, if possible, before connecting to the flow through cell. Connect the discharge tubing to the flow through cell. The flow through cell cannot be used for turbidity measurements. Turbidity should be measured prior to entering the flow through cell through the use of an inline tee fitting. Purging is considered complete and sampling may begin when the field parameters have stabilized, or the purge time has

exceeded 2 hours. Stabilization is considered to be achieved when three consecutive readings, taken at 3 to 5-minute intervals, are within the following limits:

- Turbidity (+/- 10% for values >10 NTUs. If turbidity is greater than 10 and does not stabilize, continue purging well for up to two hours, collect sample and document on the FDR and in field logbook. Collection of a filtered sample for metals analysis may be necessary if turbidity is greater than 50 NTUs.)
- DO (+/- 10% for values greater than 0.5 milligram per liter (mg/L). If three dissolved oxygen values are < 0.5 mg/L, then DO is considered stabilized)
- Specific conductivity (+/- 3%)
- Temperature (+/- 3°)
- pH (± 0.1 unit)
- ORP (± 10 millivolts)

8. To ensure the sample is representative of formation water, the final purge volume must be greater than the volume of the well drawdown (calculated by multiplying the height of the drop in water level by the radius of the well casing squared times pie) plus the volume of the sample tubing.
9. If there is excessive drawdown in the well such that water levels do not stabilize while pumping, the well can be sampled using the no-purge method. For this method, the well is purged until dry and the well allowed to recharge as much as possible. The sample is then collected from the recharged water.
10. To collect the analytical sample, disconnect the tubing from the flow through cell. Water samples for laboratory analyses must not be collected after water has passed through the flow through assembly. Fill sample containers directly from the tubing without alterations to the pumping rate (pumping rate may be lowered for the collection of VOC samples to avoid splashing or overfilling).
11. The volatile organic compound (VOC) fraction shall be collected first. The VOC sample container shall be filled without air space within the container. The VOC container should not be overfilled to avoid diluting the sample preservative. The vial should be 90% filled, and then topped off using water added incrementally from the container cap.
    - Samples will be labelled and handled consistent with the procedures in the QAPP and **Chain of Custody SOP (Table A-1)**.
12. Subsequent sampling efforts should duplicate the pump intake depth and final purge rate from the initial sampling event (use final pump dial setting information).
13. If using non-dedicated equipment, remove the pump from the well and decontaminate by flushing with the decontamination fluid specified in the **Equipment Decontamination SOP (Table A-1)**, or the site-specific FAP. Typically, decontamination will consist of flushing the pump with potable water and Alconox® followed by flushing with deionized water.

14. Complete remaining calculation and entries on the Low flow Groundwater FDR after sampling is completed at each well. Include any observations made during sampling such as color, odor, etc., in the field logbook and FDR.
15. Secure the well cap, compression plug, and lock.

4.0 ATTACHMENTS

Low Flow Groundwater Sampling Record

Field Instrument Calibration Record

Information Handout: Low Flow Groundwater Field Parameter Data

LOW FLOW GROUNDWATER SAMPLING RECORD

MACTEC

511 Congress Street
Suite 200
Portland, Maine 04101

PROJECT NAME		LOCATION ID	DATE
PROJECT NUMBER		START TIME	END TIME
SAMPLE ID	SAMPLE TIME	SITE NAME/INSTALLATION	PAGE OF

WELL DIAMETER (IN.) ☐ 1 ☐ 2 ☐ 4 ☐ 6 ☐ 8 ☐ OTHER _____

TUBING ID (INCHES) ☐ 1/8 ☐ 1/4 ☐ 3/8 ☐ 1/2 ☐ 5/8 ☐ OTHER _____

MEASUREMENT POINT (MP) ☐ TOP OF RISER (TOR) ☐ TOP OF CASING (TOC) ☐ OTHER _____

WELL INTEGRITY

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

INITIAL DTW (BMP)	FT	**FINAL DTW (BMP)**	FT	**PROT. CASING STICKUP (AGS)**	FT	**TOC/TOR DIFFERENCE**	FT
WELL DEPTH (BMP)	FT	**SCREEN INTERVAL**	FT	**PID AMBIENT AIR**	NA PPM	**REFILL TIMER SETTING**	NA SEC
WATER COLUMN	FT	**DRAWDOWN VOLUME** (final DTW- initial DTW X well diam. squared X 0.041)	GAL	**PID WELL MOUTH**	NA PPM	**DISCHARGE TIMER SETTING**	NA SEC
CALCULATED GAL/VOL (water column X well diameter^2 X 0.041)	GAL	**TOTAL VOL. PURGED** (mL per minute X total minutes X 0.00026 gal/mL)	GAL	**DRAWDOWN/ TOTAL PURGED**		**PRESSURE TO PUMP**	NA PSI

FIELD PARAMETERS WITH PROGRAM STABILIZATION CRITERIA (AS LISTED IN THE QAPP)

TIME	DTW (FT)	PURGE RATE (mL/min)	TEMP. (^{o}C) ±3%	SP. CONDUCTANCE (mS/cm) ±3%	DISS. O_2 (mg/L) ±10% or 3 values <0.5 mg/L	pH (units) ±0.1	REDOX (mv) ±10 mv	TURBIDITY (ntu) ±10% and <10 ntu or 3 values <5 ntu	PUMP INTAKE DEPTH (ft)	COMMENTS
	BEGIN PURGING									

FINAL STABILIZED FIELD PARAMETERS (rounded to appropriate significant figures)

TEMP.: nearest degree (ex. 10.1 = 10)
COND.: 3 significant figure max (ex. 1.686 = 1.69)
pH: nearest tenth (ex. 5.53 = 5.5)
DO: nearest tenth (ex. 3.51 = 3.5)
TURB: 3 SF max, nearest tenth (6.19 = 6.2, 101 = 101)
ORP: 2 SF (44.1 = 44, 191 = 190)

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- ☐ PERISTALTIC
- ☐ SUBMERSIBLE
- ☐ BLADDER _____
- ☐ WATTERA
- ☐ OTHER _____
- ☐ OTHER _____

DECON FLUIDS USED
- ☐ ALCONOX
- ☐ DEIONIZED WATER
- ☐ POTABLE WATER
- ☐ NITRIC ACID
- ☐ HEXANE
- ☐ METHANOL
- ☐ OTHER _____

TUBING/PUMP/BLADDER MATERIALS
- ☐ SILICON TUBING
- ☐ HDPE TUBING
- ☐ LDPE TUBING
- ☐ OTHER _____
- ☐ OTHER _____

- ☐ S. STEEL PUMP MATERIAL
- ☐ PVC PUMP MATERIAL
- ☐ GEOPROBE SCREEN
- ☐ OTHER _____
- ☐ OTHER _____
- ☐ OTHER _____

EQUIPMENT USED
- ☐ WL METER _____
- ☐ PID _____
- ☐ WQ METER _____
- ☐ TURB. METER _____
- ☐ PUMP _____
- ☐ OTHER _____
- ☐ FILTERS NO. ____ TYPE _____

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	ANALYTE LIST	FIELD FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	QC COLLECTED
☐							
☐							
☐							
☐							
☐							
☐							
☐							
☐							

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED — YES ☐ NO ☐

NUMBER OF GALLONS GENERATED _____

NO-PURGE METHOD UTILIZED — YES ☐ NO ☐

NOTES

Sampler Signature: Print Name:

Checked By: Date:

DEVIATIONS FROM THE WORK PLAN

REV. 3/29/2019

FIELD INSTRUMENT CALIBRATION RECORD

PROJECT NAME: _____ TASK NO: _____ DATE: _____
PROJECT NUMBER: _____ MACTEC CREW: _____
PROJECT LOCATION: _____ SAMPLER NAME: _____
WEATHER CONDITIONS (AM): _____ SAMPLER SIGNATURE: _____
WEATHER CONDITIONS (PM): _____ CHECKED BY: _____ DATE: _____

MULTI-PARAMETER WATER QUALITY METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

AM CALIBRATION
Start Time _____/End Time_____

POST CALIBRATION CHECK
Start Time _____/End Time_____

	Units	Standard Value	Meter Value	*Acceptance Criteria (AM)	Standard Value	Meter Value	*Acceptance Criteria (PM)
pH (4)	SU	4.0		+/- 0.1 pH Units			
pH (7)	SU	7.0		+/- 0.1 pH Units	7.0		+/- 0.3 pH Units
pH (10)	SU	10.0		+/- 0.1 pH Units			
Redox	+/- mV	240		+/- 10 mV	240		+/- 10 mV
Conductivity	mS/cm	1.413		+/- 0.5 % of standard	1.413		+/- 5% of standard
DO (saturated)	%	100		+/- 2% of standard			
DO (saturated)	mg/L[1] (see Chart 1)			+/- 0.2 mg/L			+/- 0.5 mg/L of standard
DO (<0.1)	mg/L	<0.1		< 0.5 mg/L			
Temperature	°C						
Baro. Press.	mmHg						

TURBIDITY METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

	Units	Standard Value	Meter Value	Standard Value	Meter Value	*Acceptance Criteria (PM)
<0.1 Standard	NTU	<0.1		<0.1		+/- 0.3 NTU of stan.
20 Standard	NTU	20		20		+/- 5% of standard
100 Standard	NTU	100		100		+/- 5% of standard
800 Standard	NTU	800		800		+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

Background	ppmv	<0.1		<0.1		within 5 ppmv of BG
Span Gas	ppmv	100		100		+/- 10% of standard

O_2-LEL 4 GAS METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

Methane	%	50		50		+/- 10% of standard
O_2	%	20.9		20.9		+/- 10% of standard
H_2S	ppmv	25		25		+/- 10% of standard
CO	ppmv	50		50		+/- 10% of standard

OTHER METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

See Notes Below for Additional Information

☐ Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.
☐ Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

		Cal. Standard Lot Number	Exp. Date
		pH (4)	
Deionized Water Source:	Portland FOS	pH (7)	
Lot#/Date Produced:		pH (10)	
Trip Blank Source:	Laboratory provided	ORP	
Sample Preservatives Source:	Laboratory provided	Conductivity	
Disposable Filter Type:	in-line 0.45µm cellulose	<0.1 Turb. Stan.	
Calibration Fluids / Standard Source:		20 Turb. Stan.	
- DO Calibration Fluid (<0.1 mg/L)	Portland FOS	100 Turb. Stan.	
- Other		800 Turb. Stan.	
- Other		PID Span Gas	
- Other		O_2-LEL Span Gas	
		Other	

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additonal acceptance criteria obtained from instrument specific manufacturer recommendations.
** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.
1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

MACTEC
511 Congress Street, Portland Maine 04101

FIELD INSTRUMENT CALIBRATION RECORD

MACTEC

NYSDEC Field Programs

Information Handout: Low Flow Groundwater Field Parameter Data

March 2017, Revised April 2020

INTRODUCTION

This sheet provides information related to field data collection during low flow groundwater sampling including: temperature, pH, turbidity, conductivity, dissolved oxygen (DO), and oxidation/reduction potential (ORP). The goal of this handout is to provide a general understanding of the data being collected to assist staff with identify situations where data may not be accurate due to improper instrument calibration or instrument error.

Documents containing additional information are provided as attachments including:

- USEPA Region 1 Standard Operating Procedure Calibration of Field Instruments (Attachment 1)
- USEPA Region 1 Low Stress (Low Flow) Purging And Sampling Procedure For The Collection Of Groundwater Samples From Monitoring Wells (Attachment 2)
- instrument information pamphlets provided by Pine Environmental (Attachment 3), and
- a link to the USGS National Field Manual website.

GENERAL CONSIDERATIONS FOR FIELD EVENTS

- Review NYSDEC Program QAPP SOPs and Project Field Activities Plan (FAP)
- Record field data on appropriate Field Data Record (FDR)
- Avoid storing equipment/instruments for long periods in extreme cold or hot conditions that might occurred in parked car in the field
- Calibrate instruments in controlled environment (room temp if possible).
- Do not get turbidity meters wet. All other equipment is typically more water resistant but is not waterproof. Care should be taken to protect all equipment during rain events.
- Record field parameter results as displayed on the instrument. Significant figures and rounding will be applied later during data summary process.
- For questions regarding equipment contact the Field Operations Lead or Bruce Cunningham 207 828-3657 if equipment is obtained from Field Operations Support group in Portland (FOS).

LOW FLOW GROUNDWATER FIELD DATA

Instruments used for low flow groundwater sampling that are currently provided by the FOS group in Portland, Maine include:

- YSI 556 Multiparameter System
- HACH 2100P Turbidimeter or HACH 2100Q
- Water level indicator

Instructions on instrument calibration, maintenance and operation which are provided by Pine Environmental Services are included in Attachment 3.

Temperature

Units: Temperature should be measured in degrees Celsius (°C).

Calibration – Thermometers are not calibrated by field staff, they are checked against a NIST Thermometer annually. Record of annual calibration filed in Portland FOS with Bruce Cunningham. If the instrument readings are questionable it can be checked with ice water which should be register approximately 0 °C

Other considerations: Some field parameters are corrected based on temperature (pH, dissolved oxygen, and specific conductance). So it is important that the temperature is correct.

Typical measurements: Average groundwater temperatures in the Northeast range from approximately 5.5 °C in Maine to 11 °C in southern New York. Seasonal temperatures vary by as much as ± 10 °C in shallow wells and less in deeper wells.

pH

Units: pH is measured in pH standard units (SU) on a scale of 0-14. The pH (power of hydrogen) scale measures the concentration of hydrogen ions in solution.

Calibration – pH will be calibrated prior to mobilization to the field and daily once prior to conducting field activities and once after sampling is complete. pH will be calibrated with 2 or 3 solutions (based on project requirements) covering the expected range. Typically pH 4 and pH 7 (and pH 10 if a third solution is required) will be used. Acceptance criteria is ± 0.1 for the AM check and ± 0.3 at pH 7 for the PM check. Rinse and dry the probe between solution checks.

Maintenance and Corrective Actions: pH is measured through the glass bulb located on the end of the probe. Do not touch the glass bulb with fingers. Oily film or scratches on the bulb will interfere with the design characteristics of the glass membrane and affect pH measurements. Do not use the instrument if the bulb is broken or scratched or if the electrode body is cracked, broken or the internal electrode has been damaged. If necessary, the probe can be replaced either through FOS or the rental company.

Typical measurements: Most groundwater in the US has pH ranging from 6 to 8.5 SU and surface water ranges from 6.5 to 8.5 SU. The pH of distilled water is usually around 5.6 SU due to dissolved CO2 and the formation of carbonic acid.

Oxidation/Reduction Potential (ORP)

Units: ORP (also referred to as redox potential [Eh]) is a measure of the intensity of electron activity between two electrodes. ORP is measured in millivolts (mV).

Calibration: ORP will be calibrated prior to mobilization to the field and daily prior to conducting field activities. The instrument should be allowed to stabilize before running daily calibrations and should be adjusted for temperature according to the manufactures specifications. Our typical calibration solution has a value of 240 mV with an acceptance criteria of ±10 mV.

Maintenance and Corrective Actions: If calibration readings are not within acceptance criteria the electrodes may need to be cleaned. Cleaning instructions are provided in the YSI technical notes or contact Bruce Cunningham for assistance. Alternatively new calibration solutions may be needed.

Typical measurements: ORP will vary from site to site and within sites depending on a variety of factors including dissolved chemicals (metals and other compounds), and pH. In general, positive values indicate an oxidizing environment and negative values indicate a reducing environment.

Redox conditions can affect the presence of dissolved chemicals in water. Iron (ferrous iron) and dissolved manganese are often present in reducing conditions and hexavalent chromium (Cr6) might be found in oxidizing conditions.

Specific Conductance (conductivity)

Units: Conductivity is measured in Siemens (S) and distance. Field data records typically use millisiemens per centimeter (mS/cm), but instruments may provide data in other converted forms (10^6 µS/cm = 10^3 mS/cm = 1 S/cm). mho may also be used as a unit of measure for conductivity; this is numerically the same S.

Calibration: Conductivity will be calibrated prior to mobilization to the field and daily once prior to conducting field activities and once after sampling is completed. Daily calibration is a check against a standard of known concentration. Acceptance criteria for conductivity is ± 0.5% for the AM check and ± 5% for the post sampling check.

Maintenance and Corrective Actions: If calibration readings are not within the acceptance criteria, the electrodes may need to be cleaned. Contact Bruce Cunningham if equipment was obtained from FOS and he will provide instructions as appropriate.

Because the actual conductivity of a solution changes with temperature, conductivity measurements are automatically normalized to 25°C by the field instrument.

Typical measurements:

Distilled Water: 0.0005 mS/cm
Deionized water: 0.00001 – 0.001 mS/cm
Tap Water: 0.5 – 0.8 mS/cm
Drinking water: 0.05 – 0.5 mS/cm
Groundwater: 0.05 – 50 mS/cm
Surface Water: 0.01 – 4 mS/cm
Sea water: 50 mS/cm

Dissolved Oxygen

Units: Instrumentation will report DO values as either percent saturation or ppm (mg/L) units. Field data should be reported in mg/L.

Calibration: DO instrument calibration check will be conducted prior to mobilization to the field and daily once prior to conducting field activities and once after sampling is complete. Calibration checks are conducted using an oxygen saturated solution and DO free solution (if require for the field program).

Calibration for DO must be adjusted based on air pressure (mmHg) and temp (°C). Use Pressure and Temperature Chart to determine saturated solution concentration (Attachment 4). Air pressure readings can be obtained from **http://weather.noaa.gov/.** Barometric pressure is often in inches Hg which can be converted to mm by multiplying inches by 25.4.

Acceptance criteria:
DO saturation solution ± 2% (0.2 mg/L) AM calibration and ± 5% (0.5 mg/L) PM calibration.
Zero solution: < 5% (0.5 mg/L) both AM and PM.

Maintenance and Corrective Actions: The DO sensor should not be allowed to dry out and should be kept moist during storage. Method performance can be negatively affected by the following:
• calibration drift
• a loose, wrinkled, or damaged membrane
• air bubbles in the electrolyte solution
• loose-fitting O-rings and membranes
• damaged, dirty, or otherwise contaminated electrodes under the membrane.

If there is a problem with the membrane, follow instructions that are included with the instrument on how to repair or replace the membrane or contact Bruce Cunningham at FOS with questions.

Typical measurements: Groundwater DO can range from near saturation (approximately 14 mg/L) in locations where the water table is near the ground surface to <2 mg/L. Although low DO could be the result of many factors, it may indicate reducing groundwater conditions due to:

- proximity to wetlands
- landfills
- VOC plumes

Turbidity

Units: Turbidity is a measure of how light is scattered or absorbed and is measured in NTU (Nephelometric Turbidity Units).

Calibration: Initial instrument calibration is completed by the manufacturer or FOS. Check standards should be run daily prior to use in the field with commercial reference standards. Acceptance criteria is ± 5%. Check standard vials should be cleaned prior to use.

Maintenance and Corrective Actions: Dirty or scratched vials/cell or air bubbles can give false results. It is important to make sure the sample vial is clean. If there are visible scratches replace the sample vial.

Typical measurements: Clean drinking water has turbidity <5 NTU. Turbidity <50 NTU may not be visually noticeable.

Additional Information:

Additional documents that provide useful include:

- USEPA Region 1 Standard Operating Procedure Calibration of Field Instruments; Quality Assurance Unit, USEPA Region I, 11 Technology Drive, North Chelmsford, MA 01863. Jan 2010.
- USEPA Region 1 Low Stress (Low Flow) Purging And Sampling Procedure For The Collection Of Groundwater Samples From Monitoring Wells (Revision 4). EQASOP-GW4. Effective date July 30, 1996, Revised September 19, 2017.
- Various information provided by instrument manufacturers **http://www.fieldenvironmental.com/assets/files/Manuals/YSI%20556%20MPS%20Manual.pdf; https://www.ysi.com/parameters/dissolved-oxygen?Dissolved-Oxygen-1**
- USGS National Field Manual for the Collection of Water-Quality Data, **http://water.usgs.gov/owq/FieldManual/**

SOP # S6

MACTEC STANDARD OPERATING PROCEDURE #S6

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) FIELD SAMPLING PROTOCOLS

April 20, 2020

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 0

APPROVED:

Charles R Staples

April 27,2020

Charles Staples, PG, Program Technical Lead — Date

Reviewed — Date

_____ _____

_____ _____

_____ _____

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) FIELD SAMPLING PROTOCOLS

1.0 PURPOSE

The purpose of this SOP is to describe the procedures/considerations when collecting soil, sediment, surface water, and groundwater samples for per- and polyfluoroalkyl substances (PFAS) characterization at a site. This SOP also describes a tiered approach that should be used to assist with field decisions. Sampling specific SOPs should also be reviewed prior to conducting field sampling activities for PFAS characterization.

This procedure applies to all MACTEC personnel and subcontractors who collect or otherwise handle samples of soil, sediment, surface water, and groundwater for analysis of PFAS. This SOP should be reviewed by all on-site personnel prior to implementation of field activities.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field log book and field forms.

Procedures and protocols in this SOP and the Program QAPP have been designed to comply with NYSDEC PFAS Sampling Guidelines (NYSDEC, 2020) (**Attached**).

2.0 REFERENCES

NYSDEC, 2020. Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs. January 2020.

3.0 PROCEDURES

Given the low detection limits associated with laboratory PFAS analysis, and the many potential sources of trace levels of PFAS, field personnel are advised to act on the side of caution by strictly following the subject protocols, frequently replacing nitrile gloves, and rinsing field equipment to help mitigate the potential for false detections of PFAS.

This section contains both the responsibilities and procedures involved with field sampling for analysis of PFAS.

3.1 Responsibilities

Project Manager

The project manager (PM) shall provide the Quality Assurance Program Plan (QAPP) and site-specific field activities plan (FAP) to project personnel, which shall include the sampling requirements for each investigation. The PM will detail deviations to the procedure provided in this SOP in the site-specific FAP.

Field Operations Lead

The field operations lead (FOL) shall ensure that samples are collected using procedures that are in accordance with the QAPP, site-specific FAPs, and applicable SOPs. The FOL shall also be required to make rational and justifiable decisions when deviations from these procedures are necessary because of field conditions or unforeseen issues and report the deviations to the PM.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing their tasks according to specifications outlined in the QAPP, site-specific FAPs, applicable SOPs, and other appropriate procedures. Field personnel are responsible for reporting deviations from procedures to the FOL and PM and documented in the field logbook and field data record.

3.2 Field Procedures/Considerations

The following are procedures/considerations to be made during field activities for PFAS sampling. A summary of the prohibited and acceptable items for PFAS investigation areas is included in Table 1. A checklist (**Attached)** shall be used daily prior to the commencement of fieldwork to ensure the field team is in compliance with this protocol.

Field Equipment

- **Do not use Teflon®-containing materials** (e.g., Teflon® tubing, bailers, tape, plumbing paste, or other Teflon® materials) since Teflon® contains fluorinated compounds.
- Sample containers and collected samples will be stored and shipped using dedicated coolers provided by the laboratory.
- Stainless steel, high-density polyethylene (HDPE), polypropylene, and silicone materials are acceptable for sampling. Samples should not be collected with tubing or stored in containers made of low-density polyethylene (LDPE) materials (fluorinated compounds are known to adsorb to LDPE). All sampling equipment components and sample containers should not come in contact with aluminum foil, LDPE, glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.
- MACTEC will use peristaltic pumps for groundwater sample collection at depths shallower than 25 feet. MACTEC will use ProActive SS Pumps with polyvinyl chloride (PVC) leads or Geotech SS Geosub pumps for groundwater sample collection at depths greater than 25 feet. These pumps are constructed with stainless steel and will minimize introductions of PFAS. PFAS-free bladder pumps may also be used for sampling. PVC (e.g. Whale®) pumps can be used for well development, if needed, but should not be used for sampling, or left in the wells.
- When using liners to collect soil samples during direct-push technology or during conventional drilling and sampling methodologies, acetate liners are to be used.
- Field reports will be documented on loose paper secured on masonite or aluminum clipboards (i.e. plastic clipboards, binders, or spiral hard cover notebooks are not acceptable) using a pen or pencil.
- **Post-It Notes are not allowed** on project sites.

- Use ballpoint pens. Pens will be used when documenting field activities in the field log and on field forms as well as labeling sample containers and preparing the Chain of Custody.
- **Do not use chemical (blue) ice packs** during the sampling program. This includes the use of ice packs for the storage of food and/or samples.

Field Clothing and Personal Protective Equipment

- **Do not wear water resistant, waterproof, or stain-treated clothing** during the field program. Field clothing made of synthetic and natural fibers (preferably cotton) are acceptable. Field clothing should be laundered without the use of fabric softener. Preferably, field gear should be cotton construction and well laundered (i.e., washed a minimum of three times prior to use after purchase). New clothing may contain PFAS related treatments. **Do not use new clothing** while sampling or sample handling.
- **Do not wear clothing or boots containing Gore-Tex™** during the sampling program as it contains a PFAS membrane.
- Safety footwear will consist of steel-toed boots made with polyurethane and PVC, untreated leather boots, or well-worn leather boots. Newer leather boots may be worn if they are covered with polypropylene, polyethane, or PVC boot covers.
- Disposable nitrile gloves must be worn at all times. Further, a new pair of nitrile gloves shall be donned prior to the following activities at each sample location:
  - Decontamination of re-usable sampling equipment.
  - Handling sample bottles or water containers.
  - Insertion of anything into the well (e.g., HDPE tubing, HydraSleeve™, bailer, etc.).
  - Insertion of silicone tubing into the peristaltic pump.
  - Sample Collection after completion of monitor well purging; and,
  - Handling of any quality assurance/quality control samples including field blanks and equipment blanks.

  In addition, gloves should be changed after the handling of any non-dedicated sampling equipment, contact with non-decontaminated surfaces, or when judged necessary by field personnel.

Sample Containers

- Different laboratories may supply sample collection containers of varying sizes dependent on the type of media to be sampled (e.g., soil, groundwater, etc.). All samples should be collected in polypropylene or HDPE bottles. The screw cap will be made of polypropylene or HDPE and may be lined or unlined. However, if lined, the liner may not be made of Teflon® or other material containing PFAS.
- Container labels will be completed using pen after the caps have been placed back on each bottle.
- Glass sample containers are not to be used due to potential loss of analyte through adsorption.

Wet Weather

- Field sampling occurring during wet weather (e.g., rainfall and snowfall) should be conducted while wearing appropriate clothing that will not pose a risk for cross-contamination. Teams will

avoid synthetic gear that has been treated with water-repellant finishes containing PFAS. Use rain gear made from polyurethane, vinyl, and wax or rubber-coated materials.

- Teams should consider the use of a gazebo tent, which can be erected overtop of the sample location and provide shelter from the rain. It should be noted that the canopy material is likely a treated surface and should be handled as such; therefore, gloves should be worn when setting up and moving the tent, changed immediately afterwards and further contact with the tent should be avoided until all sampling activities have been finished and the team is ready to move on to the next sample location.

Equipment Decontamination

- Field sampling equipment used at each sample location, will require cleaning between uses. Alconox® and Liquinox® soap is acceptable for use since the Safety Data Sheets do not list fluoro-surfactants as an ingredient (do not use Liquinox® soap if also sampling for 1,4-dioxane). However, Decon 90 will not be used during decontamination activities. Water used for the final rinse during decontamination of sampling equipment will be laboratory certified "PFAS-free" water.
- For larger equipment (e.g., drill rig and large downhole drilling and sampling equipment), decontamination will be conducted with potable water using a high-pressure washer and then rinsed using potable water.

Groundwater Sampling

- At sites with dedicated sampling equipment installed in the wells that contains Teflon (e.g., tubing, pumps), this equipment should be removed from the wells and replaced with HDPE tubing and non-Teflon containing equipment, if possible. These wells will be re-developed by removing three well volumes of water, if possible, and letting the wells recover for at least 48 hours prior to sampling.
- At sites with dedicated sampling equipment installed in the wells that contain LDPE tubing, this tubing should be removed from the wells and replaced with HDPE tubing. These wells can be sampled immediately following replacement of tubing; however, attempts should be made to remove one well volume prior to sampling. For larger wells, with higher volumes of water, it may be preferable to redevelop the wells and remove one well volume with a higher volume pump. In such cases the wells should be allowed to recover for at least 48 hours prior to sampling.

Personnel Hygiene

- Field personnel will not use cosmetics, moisturizers, hand cream, or other related products as part of their personal cleaning/showering routine on the morning of a sampling event, unless the products are applied to a part of the body that will be coved by clothing. These products may contain surfactants and represent a potential source of PFAS.
- All clothing worn by sampling personnel must have been laundered multiple times.
- Many manufactured sunblock and insect repellants contain PFAS and should not be brought or used on-site. Sunblock and insect repellants that are used on-site should consist of 100% natural

ingredients, unless previously vetted by the project chemist. A list of acceptable sunscreens and insect repellents is provided in Table 1.

- For washroom breaks, field personnel will leave the exclusion zone and then remove gloves and overalls. Field personnel should wash as normal with extra time for rinsing with water after soap use. When finished washing, the use of a mechanical dryer is preferred and the use of paper towel for drying is to be avoided (if possible).

Food Considerations

- No food or drink shall be brought on-site, with the exception of bottled water and hydration drinks (e.g., Gatorade® and Powerade®), which will only be allowed to be brought and consumed within the staging area.

Visitors

- Visitors to the investigation area are asked to remain outside of the exclusion zone during sampling activities.

4.0 TIERED APPROACH TO ASSIST WITH FIELD DECISIONS

In evaluating whether products contain PFAS and are suitable for use in the field, the tiered approach presented in Table 2 will be used to assist with field decisions. Any member of the field team should contact the project manager with questions.

Table 1. Summary of Prohibited and Acceptable Items for PFAS Sampling

Prohibited Items	Acceptable Items
Field Equipment	
Teflon® containing materials	High-density polyethylene (HDPE) materials
Storage of samples in containers made of LDPE materials	Acetate liners, HDPE bottles
Teflon® tubing	HDPE or silicone tubing
Waterproof field books not manufactured by Rite in the Rain	Rite in the Rain products or Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Sharpies®, if possible	Ballpoint pens
Post-It Notes	
Chemical (blue) ice packs	Regular ice
Excel Purity Paste TFW Multipurpose Thread Sealant Vibra-Tite Thread Sealant	Gasoils NT Non-PTFE Thread Sealant Bentonite
Equipment with Viton Components (need to be evaluated on a case by case basis, Viton contains PTFE, but may be acceptable if used in gaskets or O-rings that are sealed away and will not come into contact with sample or sampling equipment.)	

Field Clothing and PPE	
New clothing or water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing, defined as clothing that has been washed three or more times after purchase, made of synthetic or natural fibers (preferable cotton)
Clothing laundered using fabric softener	
Boots containing Gore-Tex™	Boots made with polyurethane and PVC, well-worn or untreated leather boots, leather boots with boot covers
	Reflective safety vests, Tyvek®, Cotton Clothing, synthetic under clothing, body braces
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling, unless the products are applied to body parts that will be covered by clothing.	**Sunscreens** - Alba Organics Natural Sunscreen, Yes to Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are "free" or "natural" **Insect Repellents** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics, Deep Woods Off **Sunscreen and insect repellant -** Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Lined or unlined HDPE or polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Polyurethane, vinyl, wax or rubber-coated rain gear. Gazebo tent that is only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90	Alconox® and/or Liquinox® (Do not use Liquinox® if also sampling for 1,4-dioxane).
Water from an on-site well	Potable water from municipal drinking water supply
Food Considerations	
All food and drink, with exceptions noted on the right	Bottled water and hydration drinks (i.e. Gatorade® and Powerade®) to be brought and consumed only in the staging area

Table 2. Tiered Approach

Tier and Description	Action
Tier 1: Products that *will come into direct contact* with field samples include, but are not limited to, drilling grease, sampling equipment, sample containers, and well construction materials	These products will undergo the greatest scrutiny and requires chemist's input to help evaluate the materials as a possible source of contamination[A] and as possible sampling and/or storage materials
Tier 2: Products that *will not come into direct contact* with samples, but could be *reasonably expected to contain PFAS*, such as waterproof or nonstick products	Project team/affected person can review the Safety Data Sheet (SDS)[B] and if it shows PFAS, product should not be used. If product SDS does not indicate PFAS, confirm with chemist before use

Tier 3: Products that *will not come into direct contact* with samples and are *not expected to contain PFAS*, such as ballpoint pens, zipper bags, and body braces	Project team/affected person can review SDS and if no PFAS, then appropriate to use

[A] Tier 1 products will undergo the closest scrutiny. It may be necessary to have Tier 1 products analyzed for PFAS to confirm that a specific batch or lot number does not contain PFAS. Alternate products will need to be evaluated/used if PFAS are identified in the product.

[B] SDS Check: To evaluate product SDS and/or manufacturing specs, check if the product contains anything with "fluoro" in the name or the acronyms TPE, FEP, ETFE, and/or PFA. If fluorinated compounds are not listed in the manufacturing specs and/or on the SDSs, product can be used.

5.0 ATTACHMENTS

Daily PFAS Protocol Checklist Record

NYSDEC Guidelines for Sampling and Analysis of PFAS

DAILY PFAS PROTOCOL CHECKLIST RECORD

MACTEC

511 Congress Street
Suite 200
Portland, Maine 04101

PROJECT NAME	**DATE**
PROJECT NUMBER	**START TIME**
INSTALLATION	**WEATHER**

Field Clothing and PPE (as applicable):

- ☐ Field crew in compliance with Tables 1 and 2, SOP S6
- ☐ Field crew has not used fabric softener on clothing
- ☐ Field crew has not used cosmetics, moisturizers, hand cream, or other related products on exposed body parts this morning
- ☐ Field crew has not applied unacceptable sunscreen or insect repellant

Field Clothing and PPE (as applicable):

- ☐ No Teflon® containing materials on-site
- ☐ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene
- ☐ No waterproof field books on-site other than Rite-in-the-Rain® Products
- ☐ No plastic clipboards, binders, or spiral hard cover notebooks on-site
- ☐ No adhesives (Post-it® Notes) on-site
- ☐ Coolers filled with regular ice only. No chemical (blue) ice packs in possession

Sample Containers:

- ☐ All sample containers made of HDPE or polypropylene. Samples are not stored in containers made of LDPE
- ☐ Caps are lined or unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

- ☐ For personnel in direct contact with samples and/or sampling equipment, wet weather gear made of Vinyl, polyurethane, PVC, latex or rubber-coated materials only

Equipment Decontamination:

- ☐ "PFAS-free" water on-site for decontamination of sample equipment
- ☐ Alconox and Liquinox to be used as decontamination materials

Food and Drink

- ☐ No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

If any applicable boxes cannot be checked, the Field Lead shall describe the noncompliance issues below and work with field personnel to address noncompliance issues prior to commencement of that day's work. Corrective action shall include removal of noncompliance items from the investigation area or removal of worker offsite until in compliance. Repeated failure to comply with PFC sample protocols will result in the permanent removal of worker(s) from the investigation area.

Describe the noncompliance issues (include personnel not in compliance) and action/outcome of noncompliance:

Sampler Signature: Print Name:

Checked By: Date:

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

GUIDELINES FOR SAMPLING AND ANALYSIS OF PFAS

Under NYSDEC's Part 375 Remedial Programs

January 2020



www.dec.ny.gov

Contents

Objective 1
Applicability 1
Field Sampling Procedures 1
Data Assessment and Application to Site Cleanup 2
Testing for Imported Soil 2
Analysis and Reporting 2
Appendix A: Quality Assurance Project Plan (QAPP) Guidelines for PFAS 4
Appendix B: Sampling Protocols for PFAS in Soils, Sediments and Solids 5
Appendix C: Sampling Protocols for PFAS in Monitoring Wells 7
Appendix D: Sampling Protocols for PFAS in Surface Water 9
Appendix E: Sampling Protocols for PFAS in Private Water Supply Wells 11
Appendix F: General Fish Handling Procedures for Contaminant Analysis....13
Appendix G: PFAS Analyte List 21
Appendix H: Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids 22
Appendix I: Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids 24

ERRATA SHEET for

Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Program
Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date

January 2020

Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis and reporting of PFAS, DER has developed this document to summarize procedures and update previous DER technical guidance pertaining to PFAS.

Applicability

Sampling for PFAS has already been initiated at numerous sites under DER-approved work plans, in accordance with specified procedures. All future work plans should include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day or one per twenty samples, whichever is more frequent.

Data Assessment and Application to Site Cleanup

Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10.

Water Sample Results

PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt). In addition, further assessment of water may be warranted if either of the following screening levels are met:

a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or
b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L

If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase.

Sites in the site management phase should evaluate for PFAS to determine if modification to any components of the SMP is necessary (e.g., monitoring for PFAS, upgrading treatment facilities, or performing an RSO).

Testing for Imported Soil

Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the *PFAS Analyte List* (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs.

If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Analysis and Reporting

As of January 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix F) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP) does not offer certification for PFAS in matrices other than finished drinking water. However, laboratories analyzing environmental samples for PFAS (e.g., soil, sediments, and groundwater) under DER's Part 375 remedial programs need to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537.1 or ISO 25101. Laboratories should adhere to the guidelines and criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist.

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay). Commercially methods are also available for biota and air samples.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.

Please note that TOP Assay analysis of highly-contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP-approved lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 537.1
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537.1, EPA Method 533, or ISO 25101
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification. Previous results of "non-detect" for PFAS from the UCMR3 water supply testing program are acceptable as verification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., wash room sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the latest guidelines developed by the Division of Fish and Wildlife (DFW) entitled “General Fish Handling Procedures for Contaminant Analysis” (Ver. 8).

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate "Age" column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish's tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with "fluor" in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: □Electrofishing □Gill netting □Trap netting □Trawling □Seining □Angling □Other _____

Preservation Method: □Freezing □Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) developed the following guidelines for laboratories analyzing environmental samples for PFAS under DER programs. If laboratories cannot adhere to the following guidelines, they should contact DER's Quality Assurance Officer, Dana Maikels, at dana.maikels@dec.ny.gov prior to analysis of samples.

Isotope Dilution

Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

Extraction

For water samples, the entire sample bottle should be extracted, and the sample bottle rinsed with appropriate solvent to remove any residual PFAS.

For samples with high particulates, the samples should be handled in one of the following ways:

1. Spike the entire sample bottle with isotope dilution analytes (IDAs) prior to any sample manipulation. The sample can be passed through the SPE and if it clogs, record the volume that passed through.
2. If the sample contains too much sediment to attempt passing it through the SPE cartridge, the sample should be spiked with isotope dilution analytes, centrifuged and decanted.
3. If higher reporting limits are acceptable for the project, the sample can be diluted by taking a representative aliquot of the sample. If isotope dilution analytes will be diluted out of the sample, they can be added after the dilution. The sample should be homogenized prior to taking an aliquot.

If alternate sample extraction procedures are used, please contact the DER remedial program chemist prior to employing. Any deviations in sample preparation procedures should be clearly noted in the case narrative.

Signal to Noise Ratio

For all target analyte ions used for quantification, signal to noise ratio should be 3:1 or greater.

Blanks

There should be no detections in the method blanks above the reporting limits.

Ion Transitions

The ion transitions listed below should be used for the following PFAS:

PFOA	413 > 369
PFOS	499 > 80
PFHxS	399 > 80
PFBS	299 > 80
6:2 FTS	427 > 407
8:2 FTS	527 > 507
N-EtFOSAA	584 > 419
N-MeFOSAA	570 > 419

Branched and Linear Isomers

Standards containing both branched and linear isomers should be used when standards are commercially available. Currently, quantitative standards are available for PFHxS, PFOS, NMeFOSAA, and NEtFOSAA. As more standards become available, they should be incorporated in to the method. All isomer peaks present in the standard should be integrated and the areas summed. Samples should be integrated in the same manner as the standards.

Since a quantitative standard does not exist for branched isomers of PFOA, the instrument should be calibrated using just the linear isomer and a technical (qualitative) PFOA standard should be used to identify the retention time of the branched PFOA isomers in the sample. The total response of PFOA branched and linear isomers should be integrated in the samples and quantitated using the calibration curve of the linear standard.

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated for each target analyte and the ratio compared to standards. Lab derived criteria should be used to determine if the ratios are acceptable.

Reporting

Detections below the reporting limit should be reported and qualified with a J qualifier.

The acid form of PFAS analytes should be reported. If the salt form of the PFAS was used as a stock standard, the measured mass should be corrected to report the acid form of the analyte.

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report. Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Maikels, at dana.maikels@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 14 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of five standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%. Linear fit calibration curves should have an R^2 value greater than 0.990.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects
R^2 >0.990	J flag detects and UJ non detects
Low-level calibration check <50% or >150%	J flag detects and UJ non detects
Mid-level calibration check <70% or >130%	J flag detects and UJ non detects

Initial Calibration Verification

An initial calibration verification (ICV) standard should be from a second source (if available). The ICV should be at the same concentration as the mid-level standard of the calibration curve.

ICV recovery <70% or >130%	J flag detects and non-detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated from the standards for each target analyte. Lab derived criteria should be used to determine if the ratios are acceptable. If the ratios fall outside of the laboratory criteria, qualify results as an estimated maximum concentration.

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Branched and Linear Isomers

Observed branched isomers in the sample that do not have a qualitative or quantitative standard should be noted and the analyte should be qualified as biased low in the final data review summary report. Note: The branched isomer peak should also be present in the secondary ion transition.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

APPENDIX G – SITE MANAGEMENT FORM

Water Level Monitoring and Monitoring Well Inspection Checklist
Former Speedy's Cleaners Site

Inspection Date/Initials:	**Reviewed by (signature and date):**

Location ID	Riser Pipe Elevation	Measurement Reference Point on Riser Marked (Y/N)	TOC-TOR Difference (ft.)	Depth to Water (ft.) (TOR)	Depth to BOW (ft.) (TOR)	Well ID Clearly Labeled (Y/N)	Well Lock/Cap (G/F/P)	Protective Casing (G/F/P)	Water in Annular Space (Y/N)	Concrete Pad (G/F/P)	Well Riser/Cap (G/F/P)	Well Obstruction (Y/N)	Comments ** None of the flush mounts have a working lock inside.
MW-206S	486.64												
MW-211A	486.57												
MW-212A	486.25												
HA-112*	486.55												
HA-119*	481.97												
MW-201	486.33												
MW-202	484.89												
MW-203S*	478.51												
MW-204S*	478.86												
MW-205S*	482.05												
MW-206	486.74												
MW-210	486.78												
MW-211	485.96												
MW-212	485.44												
MW-213	485.02												
MW-201I	485.39												

Notes:

MW= Monitoring Well	Poor or notable observations require input into "Comments"	Y = Yes N = No
msl = mean sea level	in. = inches ft. = feet	G = Good F = Fair
TOC = Top of Casing	BOW = bottom of well	P = Poor
TOR = top of riser	Vertical Datum is NAVD88. Survey conducted by Patriot Design and Consulting 2021, and *Survey completed by Popli Engineers on 8/3/2006 or 3/30/2009.	

SUMMARY OF GREEN REMEDIATION METRICS FOR SITE MANAGEMENT

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

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**