

**KERRY CHEMICAL COMPANY SITE
TOWN OF HANCOCK, DELAWARE COUNTY, NEW YORK**

SITE MANAGEMENT PLAN

NYSDEC SITE NO. 4-13-001

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DEPARTMENT OF ENVIRONMENTAL REMEDIATION

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WORK ASSIGNMENT D009803-38

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

OCTOBER 2023

CERTIFICATION STATEMENT

I ROBERT J MURPHY certify that I am currently a Qualified Environmental Professional as in defined in 6 NYCRR Part 375 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).

Robert J Murphy, P.G.

October 27, 2023 DATE

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1,1-DCA	1,1-dichloroethane
1,2-DCA	1,2-dichloroethane
1,2-DCE	1,2-dichloroethylene
ASP	Analytical Services Protocol
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulation
COC	Certificate of Completion
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
DWQC	Drinking Water Quality Council
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
HASP	Health and Safety Plan
GAC	Granular Activated Carbon
GDC	Geosynthetic Drainage Composite
HDPE	High-density Polyethylene
IC	Institutional Control
MEC	Marcy Excavation Company
NDP	North Detention Pond
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	perfluorooctanoic acid
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines

SCO	Soil Cleanup Objective
SDP	South Detention Pond
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
URS	URS Corporation
USEPA	United States Environmental Protection Agency
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

ES EXECUTIVE SUMMARY

The following provides a summary of the controls implemented for the Kerry Chemical Company Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan (SMP):

Site Identification: Site No. 413001 Route 268, Town of Hancock, NY

Institutional Controls:	1. Use of the property by the public is prohibited. The property may only be used for Commercial or Industrial purposes.
	2. • Any future use must follow this SMP and the September 2011 Environmental Notice, and be consistent with the December 1990 ROD and any amendments thereto; • No use of groundwater for any purposes; and • No interference with the Department's access, or parties designated by the Department, for the purpose of monitoring and maintenance of the Site.
	3. All ECs must be inspected at a frequency and in a manner defined in this SMP.
Engineering Controls:	• Sheetpile wall; • Rip rap revetment; and • Site fencing, gates, and other security features.

Site Identification:

Site No. 413001 Route 268, Town of Hancock, NY

Inspections:	Frequency
1. Monitoring well casings: Condition of lock and cover, signs of damage to casing or collar, condition of the weep hole from casing, and evidence of tampering 2. Site Fencing and Gates (North and West sides of the Site) 3. Access Road, drainage channel adjacent to the access road, and the culvert under the access road, 4. Vegetative cover 5. Rip rap revetments (channel protection) 6. Sheetpile wall	Biennially
Monitoring:	
1. Groundwater Monitoring Wells MW-4S, MW-4I, MW-5S, MW-5I, MW-5D, MW-7S, MW-7I, MW-9S, MW-10S, MW-10I, MW-10D, MW-B1S, MW-B1D, MW-B3S and MW-B3D.	Biennially
2. Contingency Groundwater Monitoring: Within 90 days of triggering the contingency monitoring measures (an increase in contaminant concentrations of 3 or more standard deviations) over a period of two or more consecutive groundwater monitoring events.	

Site Identification:

Site No. 413001 Route 268, Town of Hancock, NY

Maintenance:	
1. Monitoring Well Maintenance: • Maintain access to the wells and control surrounding vegetation, weeding, etc. No herbicides or pesticides may be used without written approval by the NYSDEC. • Replace damaged well caps and locks to keep out rodents and prevent unauthorized access. • Extend or repair well casing if required. • Replace well identification tag if missing or unreadable. • Rehabilitate and clear well of accumulated sediment if required. 2. Site Fencing and Gate Maintenance: • Repair and damaged fencing fabric, tension bars, posts or rails. • Repair damaged gate latches. • Replace damaged or removed gate locks. 3. Access Road, Drainage Channel and Culvert Maintenance: • Remove debris from the drainage channel and culvert as it accumulates. 4. Vegetative Cover Maintenance: • Areas where the vegetative cover is missing, or the underlying topsoil has been eroded should be repaired as soon as possible. • Apply seed, soil amendment, and/or fertilizer to areas of sparse/missing vegetation. • Annual mowing and/or brush hogging. 5. Revetment Maintenance: • Remove woody vegetation that is growing through riprap along the bank of Cadosia Creek. Do not use herbicides or pesticides.	Biennially

Site Identification:

Site No. 413001 Route 268, Town of Hancock, NY

Reporting:	
1. Groundwater Data	Every 2 years
2. Site Management Report	As needed
3. Periodic Review Report	Every 5 years or as requested by NYSDEC

Further descriptions of the above requirements are provided in detail in this SMP.

1 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Kerry Chemical Company (Site) located in the Town of Hancock, New York. Figure 1 presents the Site location. The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program, Site No. 413001, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

Shaw Environmental and Infrastructure (Shaw) of Louisiana entered into Contract No. D004998 with the NYSDEC to perform the first phase of remediation. This phase took place from November 2005 through May 2006. URS Corporation (URS, now AECOM) oversaw the first phase of work under NYSDEC Work Assignments (WAs) D003825-65 and D-004440-17.1. The first phase of work was documented in the *Remediation Report for the Initial Remedial Contract (URS, April 2007)*.

Ontario Specialty Contracting, Inc. (OSC) of Buffalo, New York entered into Contract No. D006281 with the NYSDEC to perform the second phase of the remediation. This phase took place from April through November 2007 URS oversaw the second phase of work under NYSDEC Work Assignment (WA) D004440-17.1. The second phase of work was documented in the *Construction Certification Report (URS, January 2008)*.

A Site Plan showing the location and boundaries of this site is provided in Figure 2. The boundaries of the Site are more fully described in the metes and bounds site description that is part of the Environmental Notice 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 Controls (ICs) and Engineering Controls (ECs) have been incorporated into the Site remedy to control exposure to remaining contamination and ensure protection of public health and the environment. An Environmental Notice granted to the NYSDEC and recorded with the Delaware County Clerk requires compliance with this SMP and all ECs and ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Notice is extinguished in accordance with Environmental Conservation Law (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 Notice 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 Notice. Failure to properly implement the SMP is a violation of the Environmental Notice, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of ECL, 6 NYCRR Part 375, and thereby subject to applicable penalties; and

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

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

1.2 Revisions and Alterations

Revisions and alterations 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. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Notice 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 in accordance with 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 on the following page includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in APPENDIX A .

Table 1: Notifications*

<u>Name</u>	<u>Contact Information</u>	<u>Required Notification**</u>
Jasmine Stefansky, NYSDEC Project Manager	518-402-9575; jasmine.stefansky@dec.ny.gov	All Notifications
Jeffrey Dyber, NYSDEC Project Manager's Supervisor	518-402-9698; jeffrey.dyber@dec.ny.gov	All Notifications
Kelly Lewandowski, NYSDEC Site Control	518-402-9569; kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
Kristin Kulow, NYSDOH Project Manager Arunesh Ghosh, NYSDOH Project Manager	607-353-4335 kristin.kulow@health.ny.gov 518-402-7860 arunesh.ghosh@health.ny.gov	Notifications 4, 6, and 7
Joshua Oliver, EA Project Manager	(315) 679-4856; joliver@eaest.com	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 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is approximately $\frac{3}{4}$ mile north of the Hamlet of Cadosia in the Town of Hancock, Delaware County, New York, as shown on Figure 1. The Site is identified as Section 417, Block 1, Lot 15 on the Delaware County Tax Map. The site encompasses approximately 8.5 acres, and is bounded by open fields and woods to the north and south, on the east by Cadosia Creek and on the west by an abandoned railroad grade and steep hillside. Cadosia Creek flows into the East Branch of the Delaware River approximately two miles south of the site.

According to the Delaware County Tax Map, the owner of the Site parcel at the time of issuance of this SMP is John Evanitsky.

The operator(s) of the site parcel(s) at the time of issuance of this SMP is NYSDEC.

2.2 Physical Setting

The site is in a sparsely populated rural area with fewer than 10 residences within a one-half-mile radius of the site. The topography surrounding the site is characterized by steep hills and glacial valleys, which are part of the Appalachian Plateau.

Cadosia Creek, a Class C stream, flows south along the east side of the property.

2.2.1 Land Use

The Site is currently an open field; all buildings were removed from the site during the first phase of the remedial action. The site is zoned industrial and is unoccupied. Site access is gained via an access road at the north end of the Site from State Route 268.

The properties adjoining the site are primarily vacant land. There is a lumber yard/mill across State Route 268 to the northeast, and residential properties to the north and south. As discussed above, Cadosia Creek, a Class C stream, flows south along the east side of the property.

2.2.2 Geology

Site soils are primarily glacio-lacustrine and fluvial deposits consisting of a mix of fine, medium and coarse gravel; sand; and clayey silts with intermittent boulders, till sequences, and fluvial deposits of varying depths. The depth to bedrock ranges from approximately 85 feet below ground surface (bgs) at the southern end of the site to approximately 90 feet bgs at the northern end of the site.

Site specific boring logs are provided in Appendix D.

2.2.3 Hydrogeology

Groundwater elevations typically range from approximately 3 feet bgs to 7 feet bgs, with groundwater being the deepest along the western side of the Site. The monitoring wells at the site were installed in order to monitor groundwater quality at three different depth intervals: shallow, intermediate and deep. However, there are no apparent confining layers separating the three depth intervals. In general, the groundwater flow direction is towards the east, southeast and south-southeast in the direction of Cadosia Creek. Table 2 presents the groundwater elevation data collected at the site from July 2010 through November 2021.

Groundwater contour maps are presented as Figures 3a (Shallow), 3b (Intermediate) and 3c (Deep). Groundwater monitoring well construction logs are provided in Appendix D.

2.3 Investigation and Remedial History

The Kerry Chemical Company operated at this site from 1908 to 1949 and was comprised of at least 9 buildings. Original plant operations utilized local hardwood trees to produce charcoal through a pyrolysis process. As chemical technology advanced, the process was modified to collect gasses liberated from the wood during heating. The collected gasses were condensed and distilled to produce methanol, methyl acetate, acetic acid, formaldehyde, and acetone. The waste products from these processes, which consisted of black or brownish tar- like substances, were reportedly pumped while hot to one of three on-site lagoons or directly into Cadosia Creek. During a road construction project in 1965, an accidental release of the tar to the adjacent Cadosia Creek caused a major fish-kill. The New York State Department of Transportation (NYSDOT) installed sheet piling along a portion of the east side of the site to prevent additional releases.

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.

A Remedial Investigation/Feasibility Study (RI/FS) was completed at the Kerry Chemical Company site in the late 1980s. A ROD was signed in December 1990 calling for on-site thermal destruction of the wood tar wastes. The ROD is included as Appendix E. A Remedial Design (RD) was completed in 1995, which complied with the ROD. Subsequently, off-site disposal was re-evaluated and incorporated into an Explanation of Significant Difference (ESD) and included in the bid documents as an alternate method of disposal. As mentioned in Section 1.1, the Site was remediated under two separate construction contracts. The initial construction contract implementing off-site disposal proceeded in late 2005 and early 2006. Extensive quantities of tar were encountered beyond the amount anticipated in the initial construction contract. A second ESD was issued and a second construction contract was advertised in August 2006 to finish the work. The second phase of work was completed in 2007.

Remedial activities conducted during the first phase of work included, but were not limited to:

- *Demolition and off-site disposal of existing structures at the site.* These structures were in the northern portion of the site.
- *Sheet piling installation.* Sheet piping was installed along the Cadosia Creek in the southern portion of the site.
- *Excavation and off-site disposal of tar-impacted materials.* The extent of tar-impacted materials found during the previous remedial action was much greater than the quantities anticipated in the contract documents. Approximately 13,000 tons of tar wastes were excavated under a work element whose bid quantity was 3,600 tons.
- *Partial site restoration.* The excavated areas were backfilled with clean fill and the disturbed areas were seeded with a temporary vegetative cover.

Remedial activities conducted during the second phase of work included, but were not limited to:

- *Excavation and off-site disposal of tar-impacted materials.* Approximately 48,000 tons of tar wastes were excavated and properly disposed. The excavation of tar-impacted materials included removal of the stream bank along Cadosia Creek on the northern portion of the site.
- *Monitoring well installation.* Thirteen monitoring wells were installed at the site during this phase of remedial work.
- *Site restoration.* The excavated areas were backfilled with clean fill. The disturbed areas were covered with a 6-inch layer of topsoil and seeded to provide permanent vegetative cover. The final grades at the site were constructed to promote sheet flow of surface water runoff across the site towards Cadosia Creek. Revetments were installed to protect the restored stream bank in the northern portion of the site.

As-built drawings for the second phase or remedial action are presented in Appendix F.

2.4 Remedial Action Objectives

As discussed in the December 1990 ROD, contamination from the wood tar at the site was not observed to impact site soils or groundwater. The primary method of transport of the site contaminants, namely polycyclic aromatic hydrocarbons (PAHs), would be wood tar particles settling into sediments in Cadosia Creek and then being ingested by fish. In addition, the emission of air contaminants from the wood tar during warm weather could have resulted in inhalation risks. Therefore, the RAO for the site were as follows:

Media	RAO for	Remedial Action Objectives
Soil	Public Health Protection	○ Prevent inhalation exposure to contaminants volatilizing from soil.
Surface Water	Public Health Protection	○ Mitigate impacts to public health resulting from ingesting surface water, or fish occupying surface water.

2.5 Remaining Contamination

The primary categories of contaminants which have exceeded applicable standards, criteria and guidance (SCGs) are inorganic compounds (metals) and PAHs. The following sections describe the nature and extent of remaining contamination in various media, following the second phase of remedial action that was completed in 2007. Following the remediation, the remedy for the Site is natural attenuation with routine monitoring. The sections below describe the nature and extent of contamination as of the most recent monitoring event in November 2021.

2.5.1 Soil

The wood tar contamination (primarily PAHs) was found to have minimal to no impact on the site soils. The wood tar was remediated as part of the 2007 remediation work. There is no remaining soil contamination on Site.

2.5.2 Groundwater

There have been no PAHs found in exceedance of NYSDEC's Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1) applicable Class GA drinking water SCGs (SCGs) in any of the samples collected over the course of the groundwater monitoring that has taken place since the remedial action was completed in November 2007.

During the most recent groundwater monitoring event in November 2021, only one semivolatile organic compound (SVOCs) was found above SCGs in one well: 2-Methylphenol in well MW-10S.

Groundwater samples collected from monitoring wells since 2007 indicate some the presence of some metals (mostly arsenic, iron and manganese) in exceedance of SCGs. These metals have been found in shallow, intermediate and deep wells throughout the site. Monitoring well MW-B1S typically contains additional metals in exceedance of SCGs. During the September 2010 sampling event, thallium was detected in every well sampled except MW-3I, MW-B1D; MW-B1S not sampled. Thallium has not been detected above SCGs in any of the other groundwater samples collected from the site since 2007.

Sampling for emerging contaminants [per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane] took place in December 2017. PFAS and 1,4-dioxane were not detected in any of the samples collected during that event.

Table 3 and Figure 4 summarize the results of all samples collected from groundwater at the site since 2007.

Overall, there is minimal groundwater contamination, primarily metals, remaining at the site. Since contamination remains in groundwater after completion of the Remedial Action, ECs/ICs are required to protect human health and the environment. The selected remedy for addressing Site contamination is “no further action” with biennial groundwater monitoring.

2.5.3 Surface Water

Surface water samples collected in 2005 indicate that there are no contaminants present in exceedance of SCGs. The surface water results were compared to TOGS 1.1.1 Class C SCGs.

2.5.4 Soil Vapor

Although not quantified, PAHs from residual wood tar contamination have the potential to volatilize during warm weather.

3 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. The ECs for this site include the site fencing, sheetpile wall and rip rap revetment channel protection. There are however groundwater monitoring wells used to monitor natural attenuation at the site. 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 Notice;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix G) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site;
- 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) restrict the use and development of the Site to industrial or commercial. Adherence to these ICs on the Site is required by the Environmental Notice and will be implemented under this SMP. ICs identified in the Environmental Notice may not be discontinued without an amendment to or extinguishment of the Environmental Notice. The IC boundaries are identified in the Environmental Notice in Appendix A. These ICs are:

- Use of the property is limited to commercial or industrial use;
- Any work that takes place on site shall be in compliance with the Health and Safety Plan (HASP). The HASP for work completed in 2021 is provided in

Appendix H. This HASP will require an update prior to any field work taking place under this SMP;

- 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 Delaware 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 Notice;
- The potential for vapor intrusion must be evaluated for any future buildings developed in the area within the IC boundaries noted on Figure 2, 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 Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess 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 SCGs or have become asymptotic at an acceptable level over an extended period. If 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 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 Project Plan provided in Appendix I.

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

- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater; and
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

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

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

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed at a minimum of once every two years. 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 (depending on the need to evaluate engineering controls). 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. During these inspections, an inspection form will be completed as provided in Appendix J – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- 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:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Notice;
- 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 NYCRR 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. Within 45 days of an emergency, the remedial party will submit follow-up status reports to the NYSDEC. These status reports will describe actions taken to respond to the emergency, and will document actions taken to restore the effectiveness of the ECs.

4.3 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the monitoring wells on a biennial basis. Sampling locations, required analytical parameters, and schedule are provided in Table 4 – Post-Remediation Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters			Schedule
	TCL VOCs (EPA Method 8260C)	TCL SVOCs (EPA Method 8270C)	TAL Metals (EPA Method 6010B/7470A)	
MW-4S MW-4I MW-5S MW-5I MW-5D MW-7S MW-7I MW-9S MW-10S MW-10I MW-10D MW-B1S MW-B1D MW-B3S MW-B3D	X	X	X	Biennially

PFAS and 1,4 dioxane were most recently sampled in 2017, and were not detected. These parameters are therefore not included in the sampling program.

Detailed sample collection and analytical procedures and protocols are provided in Appendix K – Field Activities Plan and Appendix I – Quality Assurance Project Plan. Figure 1 in Appendix K shows the monitoring wells to be included in the sampling program.

Groundwater monitoring will be performed biennially (every other year) to assess the performance of the remedy. 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. The network of on-site wells has been designed based on the following criteria:

The monitoring well network does not currently include sentinel wells that monitor downgradient plume migration. Sentinel wells are uncontaminated wells located directly downgradient of the plume and upgradient of sensitive receptors. The original monitoring well network for this site included the following sentinel wells: MW-3S and MW-3I. However, those wells were damaged by erosion of the Cadosia Creek stream bank and are no longer useable.

Table 5 on the following page summarizes the wells identification numbers, as well as the purpose, location, depths, diameter, and screened intervals of the wells. As part of the groundwater monitoring, six upgradient wells, five on-site wells, and four downgradient wells are sampled to evaluate the effectiveness of the remedial system. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

Table 5 – Monitoring Well Construction Details

Well ID	PURPOSE	Well Coordinates				Well Construction Information			
		Northing (ft)	Easting (ft)	Ground Surface Elevation (ft AMSL)	Top of Casing Elevation (ft AMSL)	Well Diameter (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Length (ft bgs)
*MW-3S	Shallow-Sentinel	54,239.31	52,979.23	1,012.61	1,015.27	2	15.5	15.5	10
*MW-3I	Intermediate-Sentinel	54,229.66	52,973.02	1,011.19	1,015.97	2	75	60	10
MW-4S	Shallow DG	54,459.64	53,148.08	1,017.29	1,019.21	2	15	15	10
MW-4I	Intermediate DG	54,467.65	53,154.20	1,017.50	1,019.91	2	44	43	10
MW-5S	Shallow On-site	54,692.80	53,262.24	1,020.49	1,022.50	2	15	15	10
MW-5I	Intermediate On-site	54,680.88	53,265.58	1,020.05	1,021.57	2	44	44	10
MW-5D	Deep On-site	54,699.89	53,271.20	1,020.43	1,022.02	2	83	82	10
MW-7S	Shallow On-site	54,887.04	53,317.77	1,022.02	1,024.78	2	15.5	15	10
MW-7I	Intermediate On-site	54,877.28	53,315.92	1,022.80	1,024.69	2	44	44	10
MW-9S	Shallow UG	55,571.63	53,256.19	1,033.54	1,035.44	2	25	24.5	20
MW-10S	Shallow UG	55,543.03	53,382.73	1,033.35	1,035.53	2	16	15	10
MW-10I	Intermediate UG	55,557.15	53,382.80	1,033.43	1,035.26	2	58.5	58	10
MW-10D	Deep UG	55,550.16	53,377.23	1,033.39	1,035.45	2	86	70	10
MW-B1S	Shallow UG	55,227.76	53,090.37	1,044.28	NM	2	NA	NA	NA
MW-B1D	Deep UG	55,226.51	53,082.30	1,044.66	NM	2	NA	NA	NA
MW-B3S	Shallow DG	54,651.45	53,130.26	1,021.05	NM	2	NA	NA	NA
MW-B3D	Deep DG	54,647.61	53,140.78	1,021.05	NM	2	NA	NA	NA

*- monitoring wells MW-3S and 3I have been damaged and are no longer functional.

DG – Downgradient

UG - Upgradient

Monitoring well construction logs are included in Appendix D 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 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix J - Site Management Forms. 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 site-specific Field Activities Plan provided as Appendix K of this document.

5 OPERATION AND MAINTENANCE PLAN

5.1 General

The Site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

Further detail regarding the Operation and Maintenance of the monitoring wells, site access road and associated riprap revetment, and Site fencing and gates is provided in Appendix L - Operation and Maintenance Manual. This Operation and Maintenance Manual, along with the complete SMP, is available in the project record. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

6 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.

As discussed in the *Construction Certification Report (URS, January 2008)* the Site was impacted by a significant flood in June 2006. The damage included partial wash-out of the access driveway, destruction of a portion of the existing fence, recontouring of a large portion of the site with the corresponding alteration of surface water flow patterns, destruction of the downchute from the swale on the railroad embankment, blockage of the stream channel in the south portion of the site, and deposition of a large quantity of trees, debris, and stone in the middle portion of the site.

A remedial design was prepared by URS under WA D004440-17.1 based on conditions at the Site after the flooding took place. This design is included as an appendix to the aforementioned *Construction Certification Report*. The work associated with that design was performed by OSC in 2006 and 2007. The restoration component of that work was aimed at addressing the aftermath of the flooding and included the construction of the diversion swale. The purpose of the diversion swale was to redirect runoff from the hillside west of the Site. The swale carries runoff around the Site, rather than allowing it to flow across the Site. The swale discharges to Cadosia Creek to the north of the Site.

There are currently no other vulnerability concerns at the Site. If conditions change, the SMP will be update per Section 1.2 of this SMP.

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).

Green remediation concepts applied to this site include (but are not limited to) carpooling, on-site disposal of purge water, and reducing mowing frequency. If conditions change, the SMP will be updated per Section 1.2 of this SMP.

6.3 Remedial System Optimization

There are currently no remedial systems in place at the Site. A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of any future remedial systems is needed.

An RSO may be appropriate if any of the following occur:

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

An RSO will provide a critique of a Site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

7 REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix J. 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 (depending on the need to evaluate engineering controls).

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

Table 6: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Biennially
Periodic Review Report	Every five years, or as otherwise determined by the NYSDEC

* 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, 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 EQuISTM 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 (PRR) will be submitted to the NYSDEC project manager beginning sixteen (16) months after the Certificate of Completion or equivalent document is issued. PRRs shall be submitted every 5 years to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A -Environmental Notice. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment, and certification of all ECs/ICs required by the remedy for the Site.
- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable.
- Description of any change of use, important of materials, or excavation that occurred during the certifying period.
- 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.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These 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;
- Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
- O&M data summary tables;
- 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 Remedial Action Work Plan (RAWP), ROD or Decision Document;
 - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
 - 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 RAWP, ROD or Decision Document; and
 - The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a 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 or engineering control identified for the site, I certify that all of the following statements are true:

- The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- Use of the site is compliant with the Environmental Notice;*
- The engineering control systems are performing as designed and are effective;*
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner’s/Remedial Party’s Designated Site Representative] (and if the site consists of multiple properties): [I have been authorized and designated by all site owners/remedial parties to sign this certification] for the site.”

“I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report. ”

At the end of each certifying period, as determined by the NYSDEC project manager, the following certification will be provided to the NYSDEC project manager:

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

- *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 Notice.*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner or Owner’s Designated Site Representative]: [and I have been authorized and designated by all site owners to sign this certification] for the site.”

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control 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.

7.4 Remedial System Optimization Report

There are currently no remedial systems in place at the Site and therefore no RSO is necessary.

If in the future an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required. The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

An RSO study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of any future remedial systems is needed.

8 REFERENCES

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

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

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

NYSDEC, 1990. Record of Decision –Kerry Chemical Company Site. December 1990.

URS, 2007. Remediation Report for the Initial Remedial Contract. April 2007.

URS, 2008. Construction Certification Report. January 2008.

TABLES

TABLE 2
GROUNDWATER ELEVATION MEASUREMENTS
KERRY CHEMICAL SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
MW-03I	54229.66	52973.02	1011.19		1015.97	I	7/20/2010 0000	3.34	1012.63	0.00		
							9/15/2010 1121	3.22	1012.75	0.00		
							12/14/2011 1201	1.51	1014.46	0.00		
							6/18/2013 0000	1.69	1014.28	0.00		
							12/8/2014 1320	1.67	1014.30	0.00		
							12/7/2015 0000	1.89	1014.08	0.00		
							12/4/2017 1120	2.43	1013.54	0.00		
							10/8/2019 0000	NM	-	NM	-	Destroyed
							11/10/2021 0000	NM	-	NM	-	Destroyed
MW-03S	54239.31	52979.23	1012.61		1015.27	A	7/20/2010 0000	5.45	1009.82	0.00		
							9/15/2010 1115	5.32	1009.95	0.00		
							12/14/2011 1159	3.64	1011.63	0.00		
							6/18/2013 0000	4.00	1011.27	0.00		
							12/8/2014 1245	4.10	1011.17	0.00		
							12/7/2015 0000	4.48	1010.79	0.00		
							12/4/2017 1130	4.67	1010.60	0.00		
							10/8/2019 0000	NM	-	NM	-	Destroyed
							11/10/2021 0000	NM	-	NM	-	Destroyed
MW-04I	54467.65	53154.2	1017.50		1019.91	I	7/20/2010 0000	6.89	1013.02	0.00		
							9/15/2010 1107	6.79	1013.12	0.00		
							12/14/2011 1148	5.17	1014.74	0.00		
							6/18/2013 0000	5.25	1014.66	0.00		
							12/8/2014 1406	5.09	1014.82	0.00		
							12/7/2015 0000	5.38	1014.53	0.00		

NM - No Measurement

Geologic Zone:

A Shallow Unconfined Aquifer
 B Deep Unconfined Aquifer
 D Bedrock Aquifer
 I Intermediate Unconfined Aquifer
 UN Unknown

Type:

MNW Monitoring Well

TABLE 2
GROUNDWATER ELEVATION MEASUREMENTS
KERRY CHEMICAL SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
							12/4/2017 1242	5.84	1014.07	0.00		
							10/8/2019 1440	6.12	1013.79	0.00		
							11/9/2021 1508	5.11	1014.80	0.00		
MW-04S	54459.64	53148.08	1017.29		1019.21	A	7/20/2010 0000	8.19	1011.02	0.00		
							9/15/2010 1110	8.50	1010.71	0.00		
							12/14/2011 1151	6.54	1012.67	0.00		
							6/18/2013 0000	6.71	1012.50	0.00		
							12/8/2014 1450	6.14	1013.07	0.00		
							12/7/2015 0000	6.64	1012.57	0.00		
							12/4/2017 1245	6.91	1012.30	0.00		
							10/8/2019 1400	7.10	1012.11	0.00		
							11/9/2021 1435	6.72	1012.49	0.00		
MW-05D	54699.89	53271.2	1020.43		1022.02	B	7/20/2010 0000	7.73	1014.29	0.00		
							9/15/2010 1052	7.60	1014.42	0.00		
							12/15/2011 1147	5.88	1016.14	0.00		
							6/18/2013 0000	5.98	1016.04	0.00		
							12/8/2014 1710	6.08	1015.94	0.00		
							12/7/2015 0000	6.14	1015.88	0.00		
							12/4/2017 1510	6.70	1015.32	0.00		
							10/9/2019 0815	7.15	1014.87	0.00		
							11/10/2021 1032	6.38	1015.64	0.00		
MW-05I	54680.88	53265.58	1020.05		1021.57	I	7/20/2010 0000	5.51	1016.06	0.00		
							9/15/2010 1056	5.41	1016.16	0.00		
							12/14/2011 1139	3.78	1017.79	0.00		

NM - No Measurement

Geologic Zone:

A Shallow Unconfined Aquifer
 B Deep Unconfined Aquifer
 D Bedrock Aquifer
 I Intermediate Unconfined Aquifer
 UN Unknown

Type:

MNW Monitoring Well

TABLE 2
GROUNDWATER ELEVATION MEASUREMENTS
KERRY CHEMICAL SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
							6/18/2013 0000	3.92	1017.65	0.00		
							12/8/2014 1539	3.80	1017.77	0.00		
							12/7/2015 0000	3.88	1017.69	0.00		
							12/4/2017 1505	4.43	1017.14	0.00		
							10/9/2019 0845	4.98	1016.59	0.00		
							11/10/2021 0938	4.04	1017.53	0.00		
MW-05S	54692.8	53262.24	1020.49		1022.50	A	7/20/2010 0000	7.90	1014.60	0.00		
							9/15/2010 1048	7.71	1014.79	0.00		
							12/14/2011 1137	6.60	1015.90	0.00		
							6/18/2013 0000	6.68	1015.82	0.00		
							12/8/2014 1635	6.40	1016.10	0.00		
							12/7/2015 0000	6.57	1015.93	0.00		
							12/4/2017 1605	7.11	1015.39	0.00		
							10/9/2019 0735	7.45	1015.05	0.00		
							11/10/2021 0850	6.88	1015.62	0.00		
MW-07I	54877.28	53315.92	1022.80		1024.69	I	7/20/2010 0000	5.44	1019.25	0.00		
							9/15/2010 1045	5.31	1019.38	0.00		
							12/14/2011 1123	3.82	1020.87	0.00		
							6/18/2013 0000	3.83	1020.86	0.00		
							12/9/2014 1153	3.82	1020.87	0.00		
							12/8/2015 0000	3.89	1020.80	0.00		
							12/5/2017 0750	4.29	1020.40	0.00		
							10/9/2019 1030	4.80	1019.89	0.00		
							11/10/2021 1250	3.88	1020.81	0.00		

NM - No Measurement

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Type:

MNW Monitoring Well

TABLE 2
GROUNDWATER ELEVATION MEASUREMENTS
KERRY CHEMICAL SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
MW-07S	54887.04	53317.77	1022.02		1024.78	A	7/20/2010 0000	8.83	1015.95	0.00		
							9/15/2010 1042	8.67	1016.11	0.00		
							12/14/2011 1120	7.82	1016.96	0.00		
							6/18/2013 0000	7.87	1016.91	0.00		
							12/9/2014 1115	7.63	1017.15	0.00		
							12/8/2015 0000	7.72	1017.06	0.00		
							12/5/2017 0750	8.20	1016.58	0.00		
							10/9/2019 0950	8.50	1016.28	0.00		
							11/10/2021 1155	7.88	1016.90	0.00		
MW-09S	55571.63	53256.19	1033.54		1035.44	A	7/20/2010 0000	7.62	1027.82	0.00		
							9/15/2010 1035	7.54	1027.90	0.00		
							12/14/2011 0855	4.56	1030.88	0.00		
							6/18/2013 0000	4.43	1031.01	0.00		
							12/9/2014 1605	4.27	1031.17	0.00		
							12/8/2015 0000	4.44	1031.00	0.00		
							12/5/2017 1010	5.81	1029.63	0.00		
							10/9/2019 1510	7.12	1028.32	0.00		
							11/10/2021 1605	5.12	1030.32	0.00		
MW-10D	55550.16	53377.23	1033.39		1035.45	B	7/20/2010 0000	8.81	1026.64	0.00		
							9/15/2010 1024	8.82	1026.63	0.00		
							12/14/2011 0834	6.62	1028.83	0.00		
							6/18/2013 0000	6.96	1028.49	0.00		
							12/9/2014 1310	6.62	1028.83	0.00		
							12/8/2015 0000	6.93	1028.52	0.00		

NM - No Measurement

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Type:

MNW Monitoring Well

TABLE 2
GROUNDWATER ELEVATION MEASUREMENTS
KERRY CHEMICAL SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
							12/5/2017 0900	7.85	1027.60	0.00		
							10/9/2019 1415	8.66	1026.79	0.00		
							11/10/2021 1522	7.52	1027.93	0.00		
MW-10I	55557.15	53382.8	1033.43		1035.26	I	7/20/2010 0000	10.02	1025.24	0.00		
							9/15/2010 1030	9.97	1025.29	0.00		
							12/14/2011 0838	7.89	1027.37	0.00		
							6/18/2013 0000	8.16	1027.10	0.00		
							12/9/2014 1505	8.03	1027.23	0.00		
							12/8/2015 0000	8.58	1026.68	0.00		
							12/5/2017 0905	9.16	1026.10	0.00		
							10/9/2019 1340	9.70	1025.56	0.00		
							11/10/2021 1440	8.54	1026.72	0.00		
MW-10S	55543.03	53382.73	1033.35		1035.53	A	7/20/2010 0000	10.55	1024.98	0.00		
							9/15/2010 1017	10.47	1025.06	0.00		
							12/14/2011 1229	8.29	1027.24	0.00		
							6/18/2013 0000	8.03	1027.50	0.00		
							12/9/2014 1415	7.54	1027.99	0.00		
							12/8/2015 0000	7.77	1027.76	0.00		
							12/5/2017 0950	9.54	1025.99	0.00		
							10/9/2019 1245	10.10	1025.43	0.00		
							11/10/2021 1345	8.82	1026.71	0.00		
MW-B1D	55226.51	53082.3	1044.66	1048.02	1047.87	B	7/20/2010 0000	21.35	1026.52	0.00		
							9/15/2010 1129	21.63	1026.24	0.00		
							12/15/2011 1401	18.61	1029.26	0.00		

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Type:

MNW Monitoring Well

TABLE 2
GROUNDWATER ELEVATION MEASUREMENTS
KERRY CHEMICAL SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
							6/19/2013 0000	19.10	1028.77	0.00		
							12/8/2014 1120	18.74	1029.13	0.00		
							12/7/2015 0000	19.17	1028.70	0.00		
							12/4/2017 0929	19.97	1027.90	0.00		
							10/8/2019 1250	21.35	1026.52	0.00		
							11/10/2021 1110	19.29	1028.58	0.00		
MW-B1S	55227.76	53090.37	1044.28	1047.79	1047.50	A						
							7/20/2010 0000	9.72	1037.78	0.00		
							9/15/2010 1134	14.25	1033.25	0.00		
							12/15/2011 1403	5.90	1041.60	0.00		
							6/18/2013 0000	6.20	1041.30	0.00		
							12/8/2014 1140	9.33	1038.17	0.00		
							12/7/2015 0000	10.57	1036.93	0.00		
							12/4/2017 0915	11.90	1035.60	0.00		
							10/8/2019 1240	14.74	1032.76	0.00		
							11/10/2021 1055	9.73	1037.77	0.00		
MW-B3D	54647.61	53140.78	1021.05	1023.87	1023.48	B						
							7/20/2010 0000	9.08	1014.40	0.00		
							9/15/2010 1100	9.30	1014.18	0.00		
							12/14/2011 1214	7.05	1016.43	0.00		
							6/18/2013 0000	7.16	1016.32	0.00		
							12/9/2014 0900	6.79	1016.69	0.00		
							12/8/2015 0000	6.88	1016.60	0.00		
							12/4/2017 1350	7.45	1016.03	0.00		
							10/8/2019 1615	8.11	1015.37	0.00		
							11/9/2021 1640	7.28	1016.20	0.00		

NM - No Measurement

Geologic Zone:

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 UN Unknown

Type:

MNW Monitoring Well

TABLE 2
GROUNDWATER ELEVATION MEASUREMENTS
KERRY CHEMICAL SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
MW-B3S	54651.45	53130.26	1021.05	1023.96	1023.42	A	7/20/2010 0000	9.28	1014.14	0.00		
							9/15/2010 1105	9.32	1014.10	0.00		
							12/14/2011 1216	7.27	1016.15	0.00		
							6/18/2013 0000	7.38	1016.04	0.00		
							12/9/2014 0950	6.92	1016.50	0.00		
							12/8/2015 0000	6.97	1016.45	0.00		
							12/4/2017 1355	7.52	1015.90	0.00		
							10/8/2019 1540	8.30	1015.12	0.00		
							11/9/2021 1600	7.38	1016.04	0.00		

NM - No Measurement

Geologic Zone:

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 UN Unknown

Type:

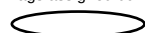
MNW Monitoring Well

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-03I	MW-03I	MW-03I	MW-03I	MW-03I
Sample ID			MW-3I-WG	MW-3I	MW-3I	MW-3I	MW-03I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/16/10	12/14/11	06/19/13	12/08/14	12/07/15
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	NA				
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-	NA				
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

Empty Cell or ND - Not Detected. NA - Not Analyzed. D- Result reported from a secondary dilution analysis.

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Only Detected Results Reported.

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-03I	MW-03I	MW-03I	MW-03I	MW-03I
Sample ID			MW-3I-WG	MW-3I	MW-3I	MW-3I	MW-03I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/16/10	12/14/11	06/19/13	12/08/14	12/07/15
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-		650	200	520	240
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000		130	130	130	120
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	21,400	23,800	23,600	23,400	22,500
Chromium	UG/L	50		3.3 J	2.2 J	2.1 J	1.1 J
Cobalt	UG/L	-					
Copper	UG/L	200	4.0 J	11	1.6 J	5.7 J	
Iron	UG/L	300	129	750	160	550	230
Lead	UG/L	25					
Magnesium	UG/L	35000	3,440 J	4,200	4,100	4,200	3,900
Manganese	UG/L	300	141	190	130	180	160
Mercury	UG/L	0.7					
Nickel	UG/L	100		3.2 J			
Potassium	UG/L	-		1,200	1,100	1,100	1,100
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	9,080 J	10,300	10,000	9,100	10,200
Thallium	UG/L	0.5					
Vanadium	UG/L	-					
Zinc	UG/L	2000	4.4 J	4.3 J	4.7 J		

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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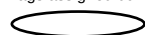
Only Detected Results Reported.

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-03I	MW-03S	MW-03S	MW-03S	MW-03S
Sample ID			MW-03I	MW-3S-WG	MW-3S	MW-3S	MW-3S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/04/17	09/16/10	12/14/11	06/19/13	12/08/14
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50	2.4 J				
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-		NA			
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-		NA			
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-03I	MW-03S	MW-03S	MW-03S	MW-03S
Sample ID			MW-03I	MW-3S-WG	MW-3S	MW-3S	MW-3S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/04/17	09/16/10	12/14/11	06/19/13	12/08/14
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-				63 J	83 J
Antimony	UG/L	3					
Arsenic	UG/L	25					5.6 J
Barium	UG/L	1000	100	299	160	130	170
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	22,300	20,900	18,600	15,200	28,500
Chromium	UG/L	50	5.3		0.92 J		1.1 J
Cobalt	UG/L	-		0.46 J		0.69 J	
Copper	UG/L	200					
Iron	UG/L	300	25 J	2,390	1,100	650	1,100
Lead	UG/L	25					
Magnesium	UG/L	35000	3,700	4,130 J	3,900	2,900	5,400
Manganese	UG/L	300	110	2,230	1,300	1,000	720
Mercury	UG/L	0.7					
Nickel	UG/L	100		0.77 J	1.8 J	1.3 J	
Potassium	UG/L	-	910		1,100	1,000	1,000
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	9,200		2,400	5,800	2,800
Thallium	UG/L	0.5		12.9			
Vanadium	UG/L	-					
Zinc	UG/L	2000	2.7 J	1.2 J	2.0 J	4.1 J	41

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

Flags assigned during chemistry validation are shown.

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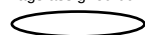
Only Detected Results Reported.

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-03S	MW-03S	MW-04I	MW-04I	MW-04I
Sample ID			MW-03S	MW-03S	MW-4I-WG	MW-4I	MW-4I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/07/15	12/04/17	09/16/10	12/14/11	06/19/13
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50		3.1 J			
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	0.30 J		NA		
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-			NA		
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-03S	MW-03S	MW-04I	MW-04I	MW-04I
Sample ID			MW-03S	MW-03S	MW-4I-WG	MW-4I	MW-4I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/07/15	12/04/17	09/16/10	12/14/11	06/19/13
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	78 J			180 J	270
Antimony	UG/L	3					
Arsenic	UG/L	25	8.4 J	5.8 J			
Barium	UG/L	1000	160	180		130	240
Beryllium	UG/L	3					
Cadmium	UG/L	5					2.7
Calcium	UG/L	-	27,000	22,600	22,500	24,500	25,300
Chromium	UG/L	50			5.4 J	3.5 J	2.3 J
Cobalt	UG/L	-		1.1 J			
Copper	UG/L	200			3.4 J		2.2 J
Iron	UG/L	300	750	980		230	310
Lead	UG/L	25					
Magnesium	UG/L	35000	5,200	4,300	4,490 J	5,100	5,300
Manganese	UG/L	300	520	2,300	651	1,200	2,800
Mercury	UG/L	0.7					
Nickel	UG/L	100				4.0 J	5.1 J
Potassium	UG/L	-	1,100	1,000	731 J	980	1,100
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	3,200	2,900	3,100 J	3,600	3,700
Thallium	UG/L	0.5			11.8		
Vanadium	UG/L	-					
Zinc	UG/L	2000		2.8 J	5.9 J	2.5 J	4.4 J

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria

Empty Cell or ND - Not Detected. NA - Not Analyzed. D- Result reported from a secondary dilution analysis.

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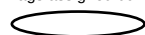
Only Detected Results Reported.

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-04I	MW-04I	MW-04I	MW-04I	MW-04I
Sample ID			MW-4I	MW-04I	MW-04I	MW-04I	MW-04I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/14	12/07/15	12/04/17	10/08/19	11/09/21
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50			2.6 J		
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-					
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-04I	MW-04I	MW-04I	MW-04I	MW-04I
Sample ID			MW-4I	MW-04I	MW-04I	MW-04I	MW-04I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/14	12/07/15	12/04/17	10/08/19	11/09/21
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	260	170 J	80 J		220
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	270	240	180	130	480
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	24,400	24,800	24,500	25,200	24,800
Chromium	UG/L	50	5.0	2.4 J			2.2 J
Cobalt	UG/L	-	0.68 J				1.3 J
Copper	UG/L	200	3.2 J	1.8 J			3.4 J
Iron	UG/L	300	330	220	110		410
Lead	UG/L	25					
Magnesium	UG/L	35000	5,200	5,200	5,000	5,200	5,000
Manganese	UG/L	300	3,300	2,800	1,800	870	5,900
Mercury	UG/L	0.7					
Nickel	UG/L	100	4.8 J	3.6 J	1.5 J		5.0 J
Potassium	UG/L	-	960	1,100	890	1,000	900
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	3,400	4,000	3,500	3,700 J+	3,400
Thallium	UG/L	0.5					
Vanadium	UG/L	-					
Zinc	UG/L	2000			2.6 J		100

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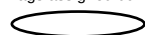
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-04S	MW-04S	MW-04S	MW-04S	MW-04S
Sample ID			MW-4S-WG	MW-4S	MW-4S	MW-4S	MW-4S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/16/10	12/14/11	06/19/13	12/08/14	12/07/15
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	NA				0.29 J
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-	NA				
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-04S	MW-04S	MW-04S	MW-04S	MW-04S
Sample ID			MW-4S-WG	MW-4S	MW-4S	MW-4S	MW-4S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/16/10	12/14/11	06/19/13	12/08/14	12/07/15
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-			370	270	380
Antimony	UG/L	3					
Arsenic	UG/L	25	109	100	170	190	190
Barium	UG/L	1000	762	740	730	830	950
Beryllium	UG/L	3					
Cadmium	UG/L	5				0.57 J	
Calcium	UG/L	-	19,600	20,100	13,000	14,000	13,700
Chromium	UG/L	50			1.5 J	2.9 J	
Cobalt	UG/L	-					
Copper	UG/L	200					
Iron	UG/L	300	9,780	9,000	14,200	15,500	16,600
Lead	UG/L	25					
Magnesium	UG/L	35000	3,200 J	3,500	2,200	2,300	2,200
Manganese	UG/L	300	3,680	4,200	3,900	4,700	5,200
Mercury	UG/L	0.7					
Nickel	UG/L	100		1.5 J		1.6 J	
Potassium	UG/L	-	1,020 J	1,300	1,300	1,200	1,400
Selenium	UG/L	10					
Silver	UG/L	50	11.2 J				
Sodium	UG/L	20000	7,140 J	7,800	7,200	8,600	11,400
Thallium	UG/L	0.5	18.9				
Vanadium	UG/L	-					
Zinc	UG/L	2000		2.7 J	2.8 J		2.2 J

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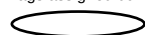
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-04S	MW-04S	MW-04S	MW-05D	MW-05D
Sample ID			MW-04S	MW-04S	MW-04S	MW-5D-WG	MW-5D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/04/17	10/08/19	11/09/21	09/16/10	12/15/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50	2.7 J				
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5		0.68 J			
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-				NA	
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-				NA	
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-04S	MW-04S	MW-04S	MW-05D	MW-05D
Sample ID			MW-04S	MW-04S	MW-04S	MW-5D-WG	MW-5D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/04/17	10/08/19	11/09/21	09/16/10	12/15/11
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-			130 J	296 J	3,200
Antimony	UG/L	3					
Arsenic	UG/L	25	120	120	200		
Barium	UG/L	1000	750	800	810		170
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	14,000	15,600	12,700	21,800	22,900
Chromium	UG/L	50	2.2 J				8.3
Cobalt	UG/L	-					2.3 J
Copper	UG/L	200					
Iron	UG/L	300	10,700	11,900 J+	18,000	416	3,800
Lead	UG/L	25	3.8 J				
Magnesium	UG/L	35000	2,000	2,300	1,900	4,500 J	5,300
Manganese	UG/L	300	5,400	5,900	5,800	183	670
Mercury	UG/L	0.7					
Nickel	UG/L	100				2.1 J	14
Potassium	UG/L	-	1,100	1,300	1,000	968 J	2,200
Selenium	UG/L	10					
Silver	UG/L	50				12.7 J	
Sodium	UG/L	20000	10,400	9,000 J+	10,100	8,650 J	9,400
Thallium	UG/L	0.5				8.4 J	
Vanadium	UG/L	-					4.2 J
Zinc	UG/L	2000	4.5 J			21.0	11

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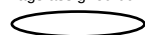
Only Detected Results Reported.

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05D	MW-05D	MW-05D	MW-05D	MW-05D
Sample ID			MW-5D	MW-5D	MW-05D	MW-05D	MW-05D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			06/19/13	12/08/14	12/07/15	12/04/17	10/09/19
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-			0.27 J		
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05D	MW-05D	MW-05D	MW-05D	MW-05D
Sample ID			MW-5D	MW-5D	MW-05D	MW-05D	MW-05D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			06/19/13	12/08/14	12/07/15	12/04/17	10/09/19
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	1,100	290	180 J		
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	130	110	110	110	110
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	23,800	22,000	22,600	23,100	23,200
Chromium	UG/L	50	2.7 J	1.6 J	1.5 J	3.7 J	5.2
Cobalt	UG/L	-					
Copper	UG/L	200					
Iron	UG/L	300	1,100	310	180		
Lead	UG/L	25				3 J	
Magnesium	UG/L	35000	5,200	4,700	4,800	4,800	4,900
Manganese	UG/L	300	180	170	100	11	10
Mercury	UG/L	0.7					
Nickel	UG/L	100	2.9 J	2.1 J			
Potassium	UG/L	-	1,500	1,000	1,100	940	910
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	9,600	8,400	9,900	9,400	8,900
Thallium	UG/L	0.5					
Vanadium	UG/L	-	1.6 J				
Zinc	UG/L	2000	3.4 J		3.4 J		

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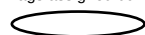
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KERRY CHEMICAL SITE

Location ID			MW-05D	MW-05I	MW-05I	MW-05I	MW-05I
Sample ID			MW-05D	MW-5I-WG	MW-5I	MW-5I	MW-5I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			11/10/21	09/16/10	12/15/11	06/19/13	12/08/14
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-		NA			
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5		2 J			
Caprolactam	UG/L	-		NA			
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05D	MW-05I	MW-05I	MW-05I	MW-05I
Sample ID			MW-05D	MW-5I-WG	MW-5I	MW-5I	MW-5I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			11/10/21	09/16/10	12/15/11	06/19/13	12/08/14
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	1,200		77 J	94 J	420
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	150		41	45	47
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	23,400	23,700	25,700	26,500	26,000
Chromium	UG/L	50	4.6		11	1.0 J	5.2
Cobalt	UG/L	-					
Copper	UG/L	200	2.4 J	3.1 J			
Iron	UG/L	300	1,100		47 J	81	390
Lead	UG/L	25					
Magnesium	UG/L	35000	4,900	2,810 J	3,200	3,300	3,300
Manganese	UG/L	300	830	80.8	67	93	110
Mercury	UG/L	0.7					
Nickel	UG/L	100	8.3 J		2.1 J		
Potassium	UG/L	-	1,400	1,010 J	1,300	1,400	1,400
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	8,900	3,680 J	4,300	4,300	3,900
Thallium	UG/L	0.5		6.7 J			
Vanadium	UG/L	-	1.5 J				
Zinc	UG/L	2000	4.7 J	1.3 J		2.3 J	

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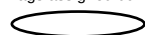
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05I	MW-05I	MW-05I	MW-05I	MW-05S
Sample ID			MW-05I	MW-05I	MW-05I	MW-05I	MW-5S-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/07/15	12/04/17	10/09/19	11/09/21	09/16/10
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50		2.5 J			
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	0.31 J				NA
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					NA
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05I	MW-05I	MW-05I	MW-05I	MW-05S
Sample ID			MW-05I	MW-05I	MW-05I	MW-05I	MW-5S-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/07/15	12/04/17	10/09/19	11/09/21	09/16/10
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	360				
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	51	39	49	49	248
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	25,500	25,100	26,600	26,000	30,300
Chromium	UG/L	50	2.8 J		2.3 J	1.9 J	
Cobalt	UG/L	-					0.51 J
Copper	UG/L	200					
Iron	UG/L	300	280	21 J	40 J+	88	419
Lead	UG/L	25					
Magnesium	UG/L	35000	3,200	3,000	3,200	3,100	5,210
Manganese	UG/L	300	110	42	130	140	3,460
Mercury	UG/L	0.7					
Nickel	UG/L	100					1.4 J
Potassium	UG/L	-	1,500	1,200	1,100	1,200	1,830 J
Selenium	UG/L	10					4.0 J
Silver	UG/L	50					13.6 J
Sodium	UG/L	20000	4,400	3,800	4,100 J+	3,900	2,020 J
Thallium	UG/L	0.5					40.2
Vanadium	UG/L	-					
Zinc	UG/L	2000		2 J		52	2.0 J

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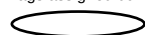
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05S	MW-05S	MW-05S	MW-05S	MW-05S
Sample ID			MW-5S	MW-5S	FD-090814	MW-5S	MW-05S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/15/11	06/19/13	12/08/14	12/08/14	12/07/15
Parameter	Units	Criteria*			Field Duplicate (1-1)		
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5			7.6 R		
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-					0.25 J
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05S	MW-05S	MW-05S	MW-05S	MW-05S
Sample ID			MW-5S	MW-5S	FD-090814	MW-5S	MW-05S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/15/11	06/19/13	12/08/14	12/08/14	12/07/15
Parameter	Units	Criteria*			Field Duplicate (1-1)		
Metals							
Aluminum	UG/L	-	67 J				
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	160	110	110	110	82
Beryllium	UG/L	3					
Cadmium	UG/L	5					0.55 J
Calcium	UG/L	-	21,800	21,200	22,200	22,300	14,300
Chromium	UG/L	50		1.5 J			
Cobalt	UG/L	-					
Copper	UG/L	200					1.7 J
Iron	UG/L	300	450	200	67	67	140
Lead	UG/L	25					
Magnesium	UG/L	35000	4,100	3,600	3,800	3,800	2,500
Manganese	UG/L	300	870	220	240	240	180
Mercury	UG/L	0.7					
Nickel	UG/L	100	2.0 J				
Potassium	UG/L	-	2,000	1,900	1,700	1,700	1,600
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	1,400	1,300	1,400	1,300	1,500
Thallium	UG/L	0.5					
Vanadium	UG/L	-					
Zinc	UG/L	2000	2.6 J	3.2 J			2.6 J

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-05S	MW-05S	MW-05S	MW-07I	MW-07I
Sample ID			MW-05S	MW-05S	MW-05S	MW-7I-WG	MW-7I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/04/17	10/09/19	11/09/21	09/15/10	12/15/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50	3.4 J				
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-				NA	
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5				2 J	
Caprolactam	UG/L	-				NA	
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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KERRY CHEMICAL SITE

Location ID			MW-05S	MW-05S	MW-05S	MW-07I	MW-07I
Sample ID			MW-05S	MW-05S	MW-05S	MW-7I-WG	MW-7I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/04/17	10/09/19	11/09/21	09/15/10	12/15/11
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-					440
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	140	340	390		64
Beryllium	UG/L	3					
Cadmium	UG/L	5		0.62 J	0.73 J		
Calcium	UG/L	-	18,000	22,700	20,200	24,300	24,400
Chromium	UG/L	50					21
Cobalt	UG/L	-			0.84 J		0.76 J
Copper	UG/L	200		2.4 J		13.5 J	13
Iron	UG/L	300	61	230 J+	110	391	740
Lead	UG/L	25					
Magnesium	UG/L	35000	3,200	3,800	3,700	3,140 J	3,500
Manganese	UG/L	300	1,200	5,300	6,700	861	670
Mercury	UG/L	0.7					
Nickel	UG/L	100		3.0 J	4.5 J	13.0 J	16
Potassium	UG/L	-	1,600	1,700	1,700	1,390 J	1,500
Selenium	UG/L	10				4.0 J	
Silver	UG/L	50				14.0 J	
Sodium	UG/L	20000	1,200	1,600 J+	1,400	7,670 J	7,900
Thallium	UG/L	0.5				14.1	
Vanadium	UG/L	-					
Zinc	UG/L	2000	1.8 J		4.9 J	58.2	5.0 J

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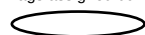
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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-07I	MW-07I	MW-07I	MW-07I	MW-07I
Sample ID			MW-7I	MW-7I	MW-07I	MW-07I	MW-07I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			06/18/13	12/09/14	12/08/15	12/05/17	10/09/19
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50				2.9 J	
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-					
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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KERRY CHEMICAL SITE

Location ID			MW-07I	MW-07I	MW-07I	MW-07I	MW-07I
Sample ID			MW-7I	MW-7I	MW-07I	MW-07I	MW-07I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			06/18/13	12/09/14	12/08/15	12/05/17	10/09/19
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	220	900	230		
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	60	67	59	40	38
Beryllium	UG/L	3					
Cadmium	UG/L	5	0.71 J				
Calcium	UG/L	-	26,100	25,600	25,200	26,700	27,000
Chromium	UG/L	50	10	14	14	21	7.9
Cobalt	UG/L	-		0.77 J			
Copper	UG/L	200	5.2 J	6.7 J	2.9 J	2.2 J	
Iron	UG/L	300	370	1,200	340	98	30 J
Lead	UG/L	25					
Magnesium	UG/L	35000	3,700	3,600	3,500	3,400	3,500
Manganese	UG/L	300	420	590	480	190	130
Mercury	UG/L	0.7					
Nickel	UG/L	100	8.5 J	11	7 J	5.5 J	2.3 J
Potassium	UG/L	-	1,600	1,600	1,500	1,300	1,300
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	8,500	7,900	8,800	7,800	8,000
Thallium	UG/L	0.5					
Vanadium	UG/L	-					
Zinc	UG/L	2000	5.8 J		2.7 J	2.8 J	

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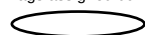
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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-07I	MW-07S	MW-07S	MW-07S	MW-07S
Sample ID			MW-07I	MW-7S-WG	MW-7S	MW-7S	MW-7S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			11/10/21	09/15/10	12/15/11	06/19/13	12/09/14
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-		NA			
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-		NA			
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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KERRY CHEMICAL SITE

Location ID			MW-07I	MW-07S	MW-07S	MW-07S	MW-07S
Sample ID			MW-07I	MW-7S-WG	MW-7S	MW-7S	MW-7S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			11/10/21	09/15/10	12/15/11	06/19/13	12/09/14
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	690			70 J	99 J
Antimony	UG/L	3					
Arsenic	UG/L	25		10.9	6.3 J		
Barium	UG/L	1000	110	287	120	120	120
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	26,700	26,200	26,100	27,400	29,000
Chromium	UG/L	50	6.9		1.2 J		
Cobalt	UG/L	-	0.80 J	0.64 J			
Copper	UG/L	200	6.0 J				
Iron	UG/L	300	860	8,470	280	220	360
Lead	UG/L	25					
Magnesium	UG/L	35000	3,500	3,710 J	4,300	3,600	3,600
Manganese	UG/L	300	1,300	5,340	110	150	28
Mercury	UG/L	0.7					
Nickel	UG/L	100	12				
Potassium	UG/L	-	1,500	1,960 J	2,600	2,100	1,800
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	7,400	1,740 J	1,900	1,300	1,200
Thallium	UG/L	0.5		32.3			
Vanadium	UG/L	-					
Zinc	UG/L	2000	110	175		1.6 J	

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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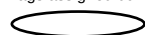
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-07S	MW-07S	MW-07S	MW-07S	MW-09S
Sample ID			MW-07S	MW-07S	MW-07S	MW-07S	MW-9S-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/05/17	10/09/19	11/10/21	09/15/10
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-					NA
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					NA
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50			24 J		
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-07S	MW-07S	MW-07S	MW-07S	MW-09S
Sample ID			MW-07S	MW-07S	MW-07S	MW-07S	MW-9S-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/05/17	10/09/19	11/10/21	09/15/10
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	65 J		160 J+	270	448 J
Antimony	UG/L	3					
Arsenic	UG/L	25			18		
Barium	UG/L	1000	120	120	550	120	101 J
Beryllium	UG/L	3					
Cadmium	UG/L	5					0.42 J
Calcium	UG/L	-	25,400	27,200	26,900	22,500	21,600
Chromium	UG/L	50				1.1 J	
Cobalt	UG/L	-			1.9 J		0.44 J
Copper	UG/L	200			1.7 J		
Iron	UG/L	300	360	430	5,600	1,500	4,570
Lead	UG/L	25					
Magnesium	UG/L	35000	3,100	3,100	3,400	2,700	1,430 J
Manganese	UG/L	300	28	68	8,300	180	942
Mercury	UG/L	0.7					
Nickel	UG/L	100			2.2 J		3.4 J
Potassium	UG/L	-	1,800	1,600	1,600	1,700	829 J
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	1,300	1,700	3,800	1,000	2,170 J
Thallium	UG/L	0.5					9.6 J
Vanadium	UG/L	-					
Zinc	UG/L	2000		2.1 J			36.7

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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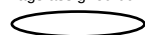
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-09S	MW-09S	MW-09S	MW-09S	MW-09S
Sample ID			MW-9S	MW-9S	MW-9S	MW-09S	MW-09S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/16/11	06/19/13	12/09/14	12/08/15	12/05/17
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					2.9 J
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-					
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
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KERRY CHEMICAL SITE

Location ID			MW-09S	MW-09S	MW-09S	MW-09S	MW-09S
Sample ID			MW-9S	MW-9S	MW-9S	MW-09S	MW-09S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/16/11	06/19/13	12/09/14	12/08/15	12/05/17
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	6,800	1,800	720	490	240
Antimony	UG/L	3					
Arsenic	UG/L	25	10	6.4 J			
Barium	UG/L	1000	110	72	65	63	54
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	11,900	14,900	17,300	15,500	15,400
Chromium	UG/L	50	8.2	1.9 J	1.5 J		
Cobalt	UG/L	-	4.4	1.1 J			
Copper	UG/L	200	15	2.3 J	1.6 J		
Iron	UG/L	300	10,000	3,500	2,500	2,200	1,700
Lead	UG/L	25	14				
Magnesium	UG/L	35000	2,300	1,600	1,600	1,400	1,400
Manganese	UG/L	300	410	240	240	230	200
Mercury	UG/L	0.7					
Nickel	UG/L	100	10	2.3 J			
Potassium	UG/L	-	2,800	1,200	750	800	610
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	960 J	1,200	1,100	1,200	1,100
Thallium	UG/L	0.5					
Vanadium	UG/L	-	7.3	2.1 J			
Zinc	UG/L	2000	30	9.5 J		1.9 J	2 J

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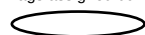
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-09S	MW-09S	MW-10D	MW-10D	MW-10D
Sample ID			MW-09S	MW-09S	DUP-091510	MW-10D-WG	MW-10D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/09/19	11/10/21	09/15/10	09/15/10	12/14/11
Parameter	Units	Criteria*			Field Duplicate (1-1)		
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					1.3
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-			NA	NA	
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-			NA	NA	
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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KERRY CHEMICAL SITE

Location ID			MW-09S	MW-09S	MW-10D	MW-10D	MW-10D
Sample ID			MW-09S	MW-09S	DUP-091510	MW-10D-WG	MW-10D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/09/19	11/10/21	09/15/10	09/15/10	12/14/11
Parameter	Units	Criteria*			Field Duplicate (1-1)		
Metals							
Aluminum	UG/L	-	110 J+	270	224 J	233 J	900
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	72	58			50
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	18,700	14,300	22,200	21,700	21,800
Chromium	UG/L	50		1.2 J			4.6
Cobalt	UG/L	-					1.1 J
Copper	UG/L	200					
Iron	UG/L	300	2,700	2,200	386	382	1,000
Lead	UG/L	25					
Magnesium	UG/L	35000	1,800	1,300	2,850 J	2,800 J	3,100
Manganese	UG/L	300	270	220	94.6	93.0	150
Mercury	UG/L	0.7					
Nickel	UG/L	100				0.68 J	3.1 J
Potassium	UG/L	-	680	670	819 J	802 J	1,200
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	1,200	1,100	4,920 J	4,810 J	5,200
Thallium	UG/L	0.5			9.4 J	9.2 J	
Vanadium	UG/L	-					
Zinc	UG/L	2000		22	8.9 J	6.8 J	4.2 J

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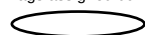
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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-10D	MW-10D	MW-10D	MW-10D	MW-10D
Sample ID			MW-10D	MW-10D	MW-10D	MW-10D	MW-10D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			06/18/13	12/09/14	12/08/15	12/05/17	10/09/19
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50				3.9 J	
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-					
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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KERRY CHEMICAL SITE

Location ID			MW-10D	MW-10D	MW-10D	MW-10D	MW-10D
Sample ID			MW-10D	MW-10D	MW-10D	MW-10D	MW-10D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			06/18/13	12/09/14	12/08/15	12/05/17	10/09/19
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	310	1,100			
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	51	53	42	39	37
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	23,500	23,100	22,900	23,600	22,500
Chromium	UG/L	50	6.3	5.4	2 J		4.3
Cobalt	UG/L	-		0.70 J			
Copper	UG/L	200	2.6 J	3.9 J			
Iron	UG/L	300	400	1,400	47 J	120	35 J
Lead	UG/L	25		3.9 J			
Magnesium	UG/L	35000	3,200	3,300	3,100	3,000	2,900
Manganese	UG/L	300	200	110	38	56	19
Mercury	UG/L	0.7					
Nickel	UG/L	100	4.7 J	3.2 J	1.3 J	1.3 J	1.5 J
Potassium	UG/L	-	1,000	1,200	970	870	770
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	5,400	5,100	5,900	5,200	4,800
Thallium	UG/L	0.5					
Vanadium	UG/L	-					
Zinc	UG/L	2000	1.9 J	11	4.1 J	2.2 J	

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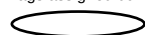
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-10D	MW-10I	MW-10I	MW-10I	MW-10I
Sample ID			MW-10D	MW-10I-WG	MW-10I	MW-10I	MW-10I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			11/10/21	09/15/10	12/14/11	06/18/13	12/09/14
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-		NA			
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-		NA			
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-10D	MW-10I	MW-10I	MW-10I	MW-10I
Sample ID			MW-10D	MW-10I-WG	MW-10I	MW-10I	MW-10I
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			11/10/21	09/15/10	12/14/11	06/18/13	12/09/14
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	160 J		2,300	1,200	1,300
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	54		87	89	76
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	23,100	23,200	24,300	26,600	25,600
Chromium	UG/L	50	3.7 J		5.7	3.2 J	3.5 J
Cobalt	UG/L	-			0.96 J		0.65 J
Copper	UG/L	200				3.4 J	2.5 J
Iron	UG/L	300	280	186	2,200	1,100	1,300
Lead	UG/L	25					
Magnesium	UG/L	35000	3,000	3,080 J	4,000	3,800	3,800
Manganese	UG/L	300	210	473	710	620	610
Mercury	UG/L	0.7					
Nickel	UG/L	100	4.3 J	0.79 J	4.1 J	2.4 J	2.0 J
Potassium	UG/L	-	890	848 J	1,600	1,400	1,300
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	5,000	8,130 J	8,100	8,500	7,400
Thallium	UG/L	0.5		6.1 J			
Vanadium	UG/L	-			2.4 J		
Zinc	UG/L	2000	1.8 J	29.5	6.9 J	9.7 J	

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-10I	MW-10I	MW-10I	MW-10I	MW-10S
Sample ID			MW-10I	MW-10I	MW-10I	MW-10I	MW-10S-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/05/17	10/09/19	11/10/21	09/15/10
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50		3.3 J			
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50			3.7 J		3 J
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					2 J
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	0.30 J				NA
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					NA
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50			4.9 J		5 J
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					1 J
Pyrene	UG/L	50					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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KERRY CHEMICAL SITE

Location ID			MW-10I	MW-10I	MW-10I	MW-10I	MW-10S
Sample ID			MW-10I	MW-10I	MW-10I	MW-10I	MW-10S-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/05/17	10/09/19	11/10/21	09/15/10
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	660		180 J+	790	
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	67	45	160	60	259
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	24,200	24,400	51,100	24,900	34,500
Chromium	UG/L	50	1.4 J	1.7 J		1.8 J	
Cobalt	UG/L	-					
Copper	UG/L	200			32		40.7
Iron	UG/L	300	610	25 J	6,600	750	8,600
Lead	UG/L	25					
Magnesium	UG/L	35000	3,400	3,200	3,100	3,400	1,900 J
Manganese	UG/L	300	420	37	2,800	230	2,440
Mercury	UG/L	0.7					
Nickel	UG/L	100	1.6 J			1.6 J	
Potassium	UG/L	-	1,200	920	2,500	1,100	1,970 J
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	8,100	7,000	3,800	6,600	3,590 J
Thallium	UG/L	0.5					30.2
Vanadium	UG/L	-					
Zinc	UG/L	2000	2.3 J		11 J+	16	17.2 J

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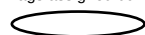
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-10S	MW-10S	MW-10S	MW-10S	MW-10S
Sample ID			FD-1	MW-10S	FD-06182013	MW-10S	MW-10S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/14/11	12/14/11	06/18/13	06/18/13	12/09/14
Parameter	Units	Criteria*	Field Duplicate (1-1)		Field Duplicate (1-1)		
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50	3.7 J			3.2 J	
Benzene	UG/L	1					
Chloromethane	UG/L	5	0.59 J				
Methyl ethyl ketone (2-Butanone)	UG/L	50			1.4 J	1.4 J	
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50			3.5 J	1.0 J	
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					0.44 J
4-Methylphenol (p-cresol)	UG/L	1					0.63 J
Benzaldehyde	UG/L	-				0.26 J	
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50	2.1 J	2.5 J			
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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KERRY CHEMICAL SITE

Location ID			MW-10S	MW-10S	MW-10S	MW-10S	MW-10S
Sample ID			FD-1	MW-10S	FD-06182013	MW-10S	MW-10S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/14/11	12/14/11	06/18/13	06/18/13	12/09/14
Parameter	Units	Criteria*	Field Duplicate (1-1)		Field Duplicate (1-1)		
Metals							
Aluminum	UG/L	-	170 J	480	170 J	180 J	270
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	130	140	120	120	80
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	27,600	25,700	29,200	29,500	17,400
Chromium	UG/L	50		1.4 J			
Cobalt	UG/L	-		0.81 J			
Copper	UG/L	200	34 J	67 J	35	39	41
Iron	UG/L	300	3,700 J	7,700 J	3,000	3,300	2,300
Lead	UG/L	25		8.8			4.3 J
Magnesium	UG/L	35000	2,000	2,000	2,100	2,100	1,500
Manganese	UG/L	300	1,200	1,300	780	770	460
Mercury	UG/L	0.7					
Nickel	UG/L	100		2.2 J			
Potassium	UG/L	-	1,900	1,900	1,900	2,000	1,300
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	1,800	1,800	1,900	2,000	1,500
Thallium	UG/L	0.5					
Vanadium	UG/L	-	1.2 J	2.2 J			
Zinc	UG/L	2000	8.0 J	9.0 J	6.7 J	6.9 J	17

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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-10S	MW-10S	MW-10S	MW-10S	MW-10S
Sample ID			FD-120815	MW-10S	MW-10S	MW-10S	MW-10S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/08/15	12/05/17	10/09/19	11/10/21
Parameter	Units	Criteria*	Field Duplicate (1-1)				
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50			4.3 J		
Benzene	UG/L	1			0.31 J		
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5			0.31 J		
Xylene (total)	UG/L	5			0.36 J		
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50	3.3 J	2.7 J			3.1 J
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					1.3 J
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	0.51 J				
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50		0.35 J			
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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KERRY CHEMICAL SITE

Location ID			MW-10S	MW-10S	MW-10S	MW-10S	MW-10S
Sample ID			FD-120815	MW-10S	MW-10S	MW-10S	MW-10S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/08/15	12/05/17	10/09/19	11/10/21
Parameter	Units	Criteria*	Field Duplicate (1-1)				
Metals							
Aluminum	UG/L	-	280	340	120 J		590
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	93	97	120	50	110
Beryllium	UG/L	3					
Cadmium	UG/L	5			1.5 J		
Calcium	UG/L	-	21,600	21,500	38,900	25,100	23,900
Chromium	UG/L	50				1.5 J	1.1 J
Cobalt	UG/L	-					
Copper	UG/L	200	41	47	27		67
Iron	UG/L	300	2,300	2,900	2,200		4,700
Lead	UG/L	25	3.5 J	4.9 J	4.2 J		12
Magnesium	UG/L	35000	1,700	1,800	2,400	3,300	2,400
Manganese	UG/L	300	560	580	1,600	12	560
Mercury	UG/L	0.7					
Nickel	UG/L	100					
Potassium	UG/L	-	1,600	1,500	2,100	950	1,800
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	1,800	1,800	3,000	6,900	2,000
Thallium	UG/L	0.5					
Vanadium	UG/L	-					2.0 J
Zinc	UG/L	2000	15	15	14		15

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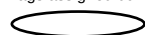
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B1D	MW-B1D	MW-B1D	MW-B1D	MW-B1D
Sample ID			MW-B1D-WG	MW-B1D	MW-B1D	MW-B1D	MW-B1D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/16/10	12/15/11	06/19/13	12/09/14	12/08/15
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	NA				
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5	1 J				
Caprolactam	UG/L	-	NA				
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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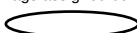
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B1D	MW-B1D	MW-B1D	MW-B1D	MW-B1D
Sample ID			MW-B1D-WG	MW-B1D	MW-B1D	MW-B1D	MW-B1D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/16/10	12/15/11	06/19/13	12/09/14	12/08/15
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	1,020 J	2,600	3,000	330	290
Antimony	UG/L	3					
Arsenic	UG/L	25		9.3 J	9.7 J		6.3 J
Barium	UG/L	1000		55	66	32	35
Beryllium	UG/L	3					
Cadmium	UG/L	5			0.67 J		
Calcium	UG/L	-	15,500	26,700	19,200	15,600	13,200
Chromium	UG/L	50		7.1	7.6	2.0 J	1.8 J
Cobalt	UG/L	-	0.65 J	1.2 J	1.8 J		
Copper	UG/L	200			4.7 J		
Iron	UG/L	300	1,700	2,600	4,300	250	230
Lead	UG/L	25					
Magnesium	UG/L	35000	1,310 J	1,300	2,100	1,400	1,600
Manganese	UG/L	300	82.4	110	170	7.2	7.7
Mercury	UG/L	0.7					
Nickel	UG/L	100	2.2 J	2.1 J	4.3 J		
Potassium	UG/L	-		2,300	2,500	1,300	1,400
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	2,750 J	3,500	3,500	3,100	3,500
Thallium	UG/L	0.5					
Vanadium	UG/L	-		4.2 J	5.0	2.1 J	1.6 J
Zinc	UG/L	2000	9.1 J	13	26		4.2 J

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KERRY CHEMICAL SITE

Location ID			MW-B1D	MW-B1D	MW-B1D	MW-B1S	MW-B1S
Sample ID			MW-B1D	MW-B1D	MW-B1D	MW-B1S	MW-B1S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/05/17	10/09/19	11/10/21	06/19/13	12/09/14
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50				3.4 J	
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1				1.2 J	
Benzaldehyde	UG/L	-				0.33 J	
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002				0.72 J	0.53 J
bis(2-Ethylhexyl)phthalate	UG/L	5				1.7 J	
Caprolactam	UG/L	-	280 D				
Diethylphthalate	UG/L	50	0.86 J				
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50				1.3 J	0.43 J
Naphthalene	UG/L	10					
Pyrene	UG/L	50				1.2 J	0.41 J

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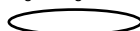
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B1D	MW-B1D	MW-B1D	MW-B1S	MW-B1S
Sample ID			MW-B1D	MW-B1D	MW-B1D	MW-B1S	MW-B1S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/05/17	10/09/19	11/10/21	06/19/13	12/09/14
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	2,800	160 J+	500	17,400	12,000
Antimony	UG/L	3					
Arsenic	UG/L	25	6.9 J			21	
Barium	UG/L	1000	66	29	44	550	190
Beryllium	UG/L	3				1.4 J	0.49 J
Cadmium	UG/L	5	1.3 J	0.66 J		5.8	3.7
Calcium	UG/L	-	16,500	14,100	16,800	29,400	15,200
Chromium	UG/L	50	6.7	2.9 J	2.6 J	25	15
Cobalt	UG/L	-	0.81 J			15	6.9
Copper	UG/L	200	4.6 J			41	24
Iron	UG/L	300	2,500	140 J+	460	29,300	17,100
Lead	UG/L	25	5.8 J			55	26
Magnesium	UG/L	35000	2,200	1,300	1,900	4,000	3,200
Manganese	UG/L	300	82	5.9	18	1,400	620
Mercury	UG/L	0.7					
Nickel	UG/L	100	2.7 J			28	14
Potassium	UG/L	-	2,300	1,300	1,300	5,700	4,300
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	3,600	3,300 J+	3,000	1,600	1,200
Thallium	UG/L	0.5					
Vanadium	UG/L	-	5.7	1.8 J	2.1 J	24	16
Zinc	UG/L	2000	22	12 J+	2.2 J	260	140

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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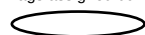
Only Detected Results Reported.

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B1S	MW-B1S	MW-B1S	MW-B1S	MW-B3D
Sample ID			MW-B1S	MW-B1S	MW-B1S	MW-B1S	MW-B3D-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/05/17	10/09/19	11/10/21	09/15/10
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50		4.7 J	3.4 J		
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-	0.35 J				NA
Benzo(a)anthracene	UG/L	0.002		1.9 J			
Benzo(b)fluoranthene	UG/L	0.002		2.2 J			
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-		1,700 D			NA
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50		4.4 J	0.44 J		
Naphthalene	UG/L	10					
Pyrene	UG/L	50		4.5 J	0.48 J		

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B1S	MW-B1S	MW-B1S	MW-B1S	MW-B3D
Sample ID			MW-B1S	MW-B1S	MW-B1S	MW-B1S	MW-B3D-WG
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/15	12/05/17	10/09/19	11/10/21	09/15/10
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	29,700	42,500	78,200 J+	10,600	
Antimony	UG/L	3			14 J		
Arsenic	UG/L	25	28	36	56		
Barium	UG/L	1000	410	720	1,500	180	
Beryllium	UG/L	3	1.3 J	2.3	5.1	0.37 J	
Cadmium	UG/L	5	7.4	16	33	2.0	
Calcium	UG/L	-	19,500	36,800	69,800	12,700	23,000
Chromium	UG/L	50	36	56	96	14	
Cobalt	UG/L	-	16	34	76	5.2	
Copper	UG/L	200	70	140	200	18	
Iron	UG/L	300	41,700	71,400	143,000 J+	16,600	283
Lead	UG/L	25	75	170	260 J-	19	
Magnesium	UG/L	35000	5,500	8,400	14,200	2,600	2,650 J
Manganese	UG/L	300	1,200	2,200	5,200	630	137
Mercury	UG/L	0.7	0.16 J	0.15 J	0.60		
Nickel	UG/L	100	31	59	120	11	
Potassium	UG/L	-	7,200	8,600	11,900	3,500	742 J
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	1,900	1,400	1,900 J+	1,100	2,520 J
Thallium	UG/L	0.5					7.7 J
Vanadium	UG/L	-	39	64	120	14	
Zinc	UG/L	2000	380	700	1,400 J+	130	3.9 J

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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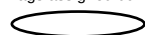
Only Detected Results Reported.

TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B3D	MW-B3D	MW-B3D	MW-B3D	MW-B3D
Sample ID			MW-B3D	MW-B3D	MW-B3D	MW-B3D	MW-B3D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/15/11	06/19/13	12/09/14	12/08/15	12/04/17
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					2.7 J
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-				0.34 J	
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B3D	MW-B3D	MW-B3D	MW-B3D	MW-B3D
Sample ID			MW-B3D	MW-B3D	MW-B3D	MW-B3D	MW-B3D
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/15/11	06/19/13	12/09/14	12/08/15	12/04/17
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-	140 J	82 J	170 J	94 J	
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	56	54	110	96	39
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	26,500	24,900	26,200	25,000	25,000
Chromium	UG/L	50	1.2 J		1.4 J		
Cobalt	UG/L	-	0.78 J	0.83 J	4.2	3.2 J	
Copper	UG/L	200					
Iron	UG/L	300	140	87	230	130	
Lead	UG/L	25					
Magnesium	UG/L	35000	3,100	3,100	3,200	3,000	3,000
Manganese	UG/L	300	500	530	2,800	2,100	180
Mercury	UG/L	0.7					
Nickel	UG/L	100	1.6 J		2.4 J	2.3 J	
Potassium	UG/L	-	1,300	900	980	950	890
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	3,200	3,000	2,900	3,200	2,900
Thallium	UG/L	0.5					
Vanadium	UG/L	-					
Zinc	UG/L	2000	2.7 J	2.6 J			3 J

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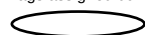
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B3D	MW-B3D	MW-B3S	MW-B3S	MW-B3S
Sample ID			MW-B3D	MW-B3D	MW-B3S-WG	MW-B3S	MW-B3S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/08/19	11/09/21	09/15/10	12/15/11	06/19/13
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-			NA		
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-			NA		
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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Location ID			MW-B3D	MW-B3D	MW-B3S	MW-B3S	MW-B3S
Sample ID			MW-B3D	MW-B3D	MW-B3S-WG	MW-B3S	MW-B3S
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/08/19	11/09/21	09/15/10	12/15/11	06/19/13
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	-		240			
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	63	200		120	110
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	24,300	25,600	19,000	19,700	17,500
Chromium	UG/L	50				1.0 J	
Cobalt	UG/L	-	2.1 J	13			
Copper	UG/L	200			2.6 J		
Iron	UG/L	300	32 J+	320		66	25 J
Lead	UG/L	25					
Magnesium	UG/L	35000	2,900	3,000	3,820 J	4,400	3,900
Manganese	UG/L	300	1,000	6,000	114	390	320
Mercury	UG/L	0.7					
Nickel	UG/L	100		6.1 J			
Potassium	UG/L	-	830	900	526 J	800	730
Selenium	UG/L	10					
Silver	UG/L	50			16.2 J		
Sodium	UG/L	20000	2,900 J+	2,800	1,470 J	1,700	1,600
Thallium	UG/L	0.5			5.5 J		
Vanadium	UG/L	-					
Zinc	UG/L	2000		12	1.8 J	2.7 J	2.7 J

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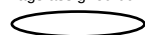
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TABLE 3
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KERRY CHEMICAL SITE

Location ID			MW-B3S	MW-B3S	MW-B3S	MW-B3S	MW-B3S
Sample ID			MW-B3S	MW-B3S	FD-120417	MW-B3S	FD-100819
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/09/14	12/08/15	12/04/17	12/04/17	10/08/19
Parameter	Units	Criteria*			Field Duplicate (1-1)		Field Duplicate (1-1)
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	UG/L	5					
Acetone	UG/L	50			3.6 J	3.5 J	
Benzene	UG/L	1					
Chloromethane	UG/L	5					
Methyl ethyl ketone (2-Butanone)	UG/L	50					
Toluene	UG/L	5					
Xylene (total)	UG/L	5					
Semivolatile Organic Compounds							
2,4-Dichlorophenol	UG/L	5					
2,4-Dimethylphenol	UG/L	50					
2,6-Dinitrotoluene	UG/L	5					
2-Methylphenol (o-cresol)	UG/L	1					
4-Methylphenol (p-cresol)	UG/L	1					
Benzaldehyde	UG/L	-		0.39 J			
Benzo(a)anthracene	UG/L	0.002					
Benzo(b)fluoranthene	UG/L	0.002					
bis(2-Ethylhexyl)phthalate	UG/L	5					
Caprolactam	UG/L	-					
Diethylphthalate	UG/L	50					
Dimethylphthalate	UG/L	50					
Di-n-butylphthalate	UG/L	50					
Fluoranthene	UG/L	50					
Naphthalene	UG/L	10					
Pyrene	UG/L	50					

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KERRY CHEMICAL SITE

Location ID			MW-B3S	MW-B3S	MW-B3S	MW-B3S	MW-B3S
Sample ID			MW-B3S	MW-B3S	FD-120417	MW-B3S	FD-100819
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/09/14	12/08/15	12/04/17	12/04/17	10/08/19
Parameter	Units	Criteria*			Field Duplicate (1-1)		Field Duplicate (1-1)
Metals							
Aluminum	UG/L	-	85 J	100 J	64 J		
Antimony	UG/L	3					
Arsenic	UG/L	25					
Barium	UG/L	1000	120	180	160	180	190
Beryllium	UG/L	3					
Cadmium	UG/L	5					
Calcium	UG/L	-	15,400	10,200	11,700	11,700	23,700
Chromium	UG/L	50					
Cobalt	UG/L	-					
Copper	UG/L	200					
Iron	UG/L	300	62	88	36 J	35 J	45 J
Lead	UG/L	25					
Magnesium	UG/L	35000	3,600	2,800	2,800	2,800	5,200
Manganese	UG/L	300	980	940	640 J	850 J	1,600
Mercury	UG/L	0.7					
Nickel	UG/L	100					
Potassium	UG/L	-	650	780	680	690	700
Selenium	UG/L	10					
Silver	UG/L	50					
Sodium	UG/L	20000	1,300	1,300	1,100	1,100	2,100
Thallium	UG/L	0.5					
Vanadium	UG/L	-					
Zinc	UG/L	2000		2.1 J	2 J	3.2 J	

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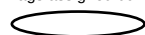
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TABLE 3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B3S	MW-B3S	MW-B3S
Sample ID			MW-B3S	FD-110921	MW-B3S
Matrix			Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-
Date Sampled			10/08/19	11/09/21	11/09/21
Parameter	Units	Criteria*		Field Duplicate (1-1)	
Volatile Organic Compounds					
1,2,4-Trichlorobenzene	UG/L	5			
Acetone	UG/L	50			
Benzene	UG/L	1			
Chloromethane	UG/L	5			
Methyl ethyl ketone (2-Butanone)	UG/L	50			
Toluene	UG/L	5			
Xylene (total)	UG/L	5			
Semivolatile Organic Compounds					
2,4-Dichlorophenol	UG/L	5			
2,4-Dimethylphenol	UG/L	50			
2,6-Dinitrotoluene	UG/L	5			
2-Methylphenol (o-cresol)	UG/L	1			
4-Methylphenol (p-cresol)	UG/L	1			
Benzaldehyde	UG/L	-			
Benzo(a)anthracene	UG/L	0.002			
Benzo(b)fluoranthene	UG/L	0.002			
bis(2-Ethylhexyl)phthalate	UG/L	5			
Caprolactam	UG/L	-			
Diethylphthalate	UG/L	50			
Dimethylphthalate	UG/L	50			
Di-n-butylphthalate	UG/L	50			
Fluoranthene	UG/L	50			
Naphthalene	UG/L	10			
Pyrene	UG/L	50			

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998 (includes 4/2000 and 6/2004 Addenda) Class GA.

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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER
KERRY CHEMICAL SITE

Location ID			MW-B3S	MW-B3S	MW-B3S
Sample ID			MW-B3S	FD-110921	MW-B3S
Matrix			Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-
Date Sampled			10/08/19	11/09/21	11/09/21
Parameter	Units	Criteria*		Field Duplicate (1-1)	
Metals					
Aluminum	UG/L	-	66 J+	70 J	66 J
Antimony	UG/L	3			
Arsenic	UG/L	25			
Barium	UG/L	1000	180	400	360
Beryllium	UG/L	3			
Cadmium	UG/L	5			
Calcium	UG/L	-	23,900	24,300	24,300
Chromium	UG/L	50			
Cobalt	UG/L	-			
Copper	UG/L	200			
Iron	UG/L	300	33 J+	67	66
Lead	UG/L	25			
Magnesium	UG/L	35000	5,300	5,300	5,300
Manganese	UG/L	300	1,400	4,300	3,800
Mercury	UG/L	0.7			
Nickel	UG/L	100			
Potassium	UG/L	-	870	750	760
Selenium	UG/L	10			
Silver	UG/L	50			
Sodium	UG/L	20000	2,300 J+	2,000	2,000
Thallium	UG/L	0.5			
Vanadium	UG/L	-			
Zinc	UG/L	2000		14	13

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 Concentration Exceeds Criteria

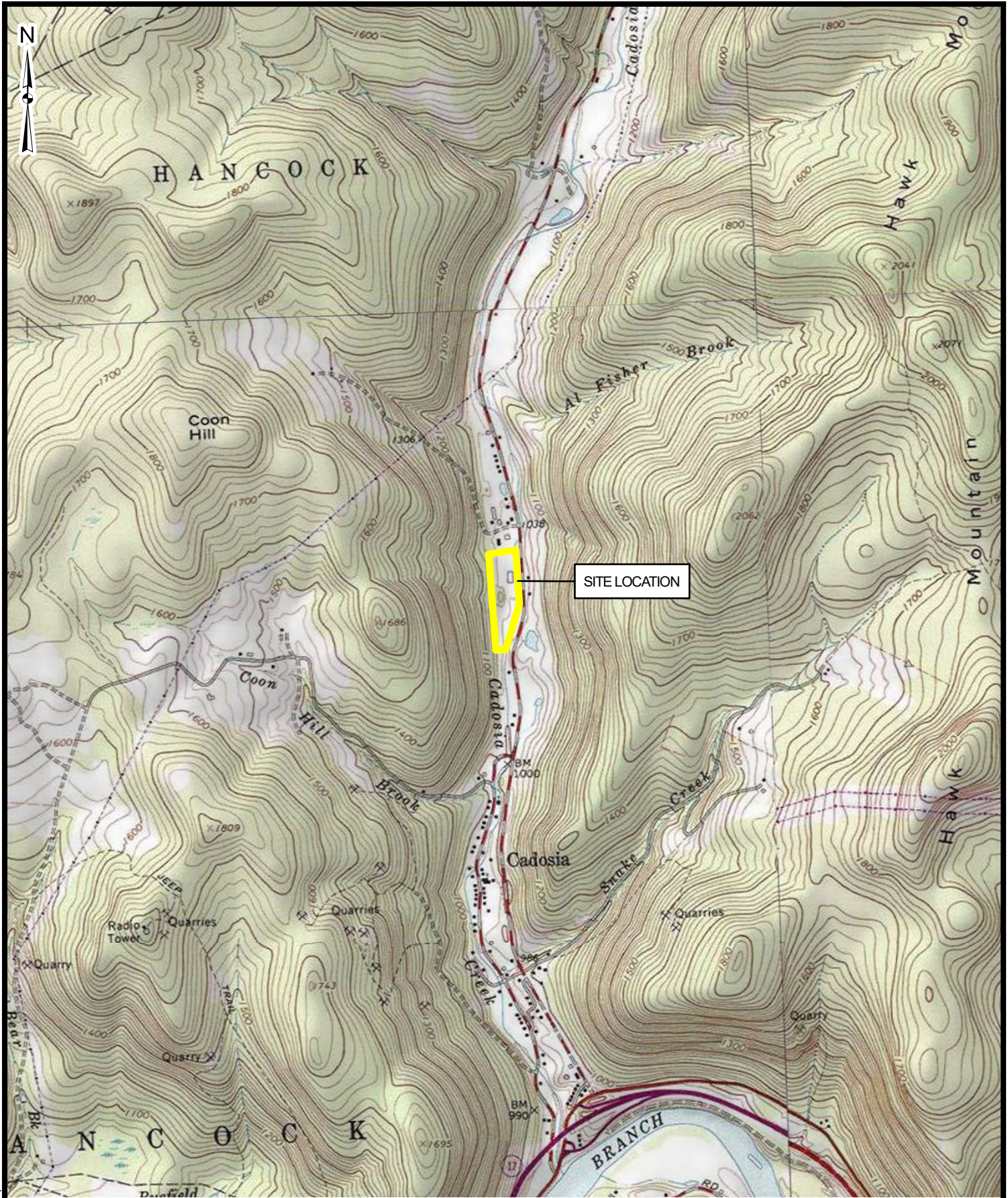
Empty Cell or ND - Not Detected. NA - Not Analyzed. D- Result reported from a secondary dilution analysis.

J - The reported concentration is an estimated value. J- - Estimated value, low bias. J+ - Estimated value, high bias.

R - The data is rejected.

Only Detected Results Reported.

FIGURES



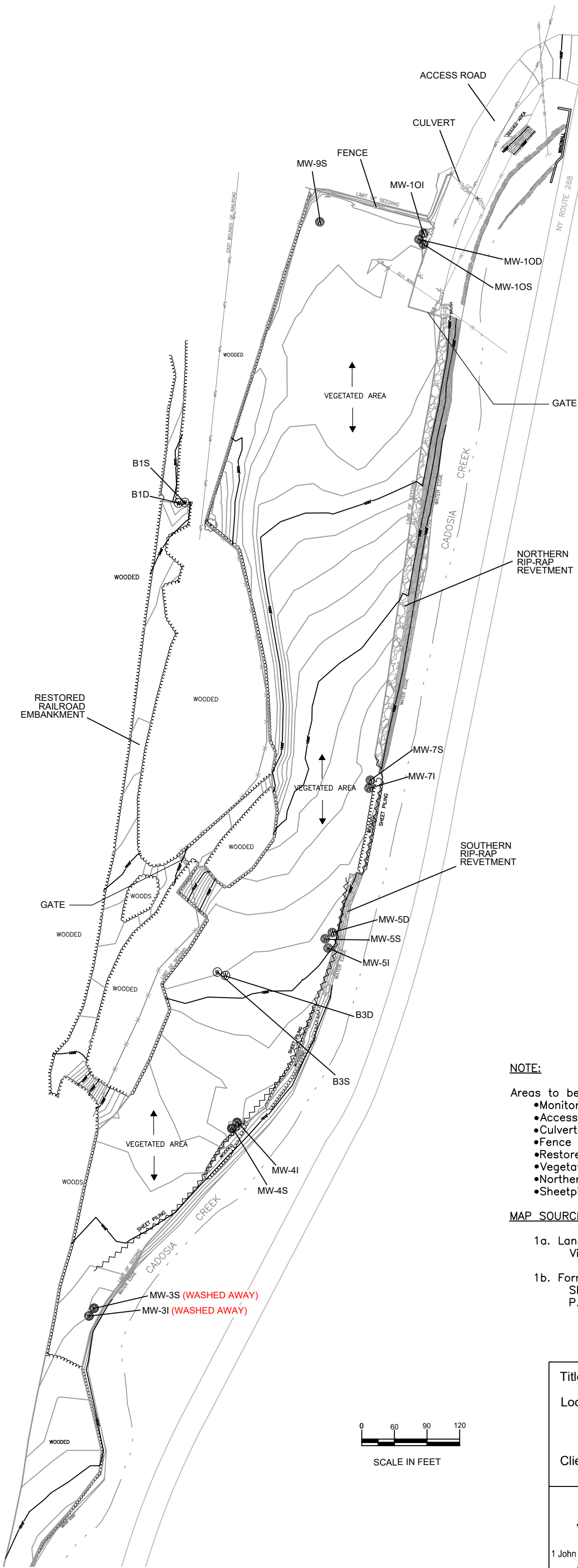
Source: National Geographic Society

2,000 0 2,000 Feet

AECOM

SITE LOCATION MAP
KERRY CHEMICAL COMPANY
HANCOCK, NY

FIGURE 1



LEGEND

FENCE	—X—
OVERHEAD ELECTRIC LINE	—OE—
OVERHEAD TELEPHONE LINE	—OT—
OVERHEAD CABLE T.V. LINE	—OCTV—
APPROXIMATE PROPERTY LINE	—APL—
WOODED AREA	~~~~~
SHEET PILING	~~~~~
LIMITS OF SEEDING/TOPSOIL	—
CULVERT PIPE	—ST—
RIP-RAP	~~~~~
NEW MONITORING WELL	⊙ MW-10I
EXISTING MONITORING WELL	⊙ B3D

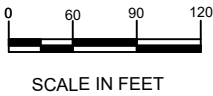
NOTE:

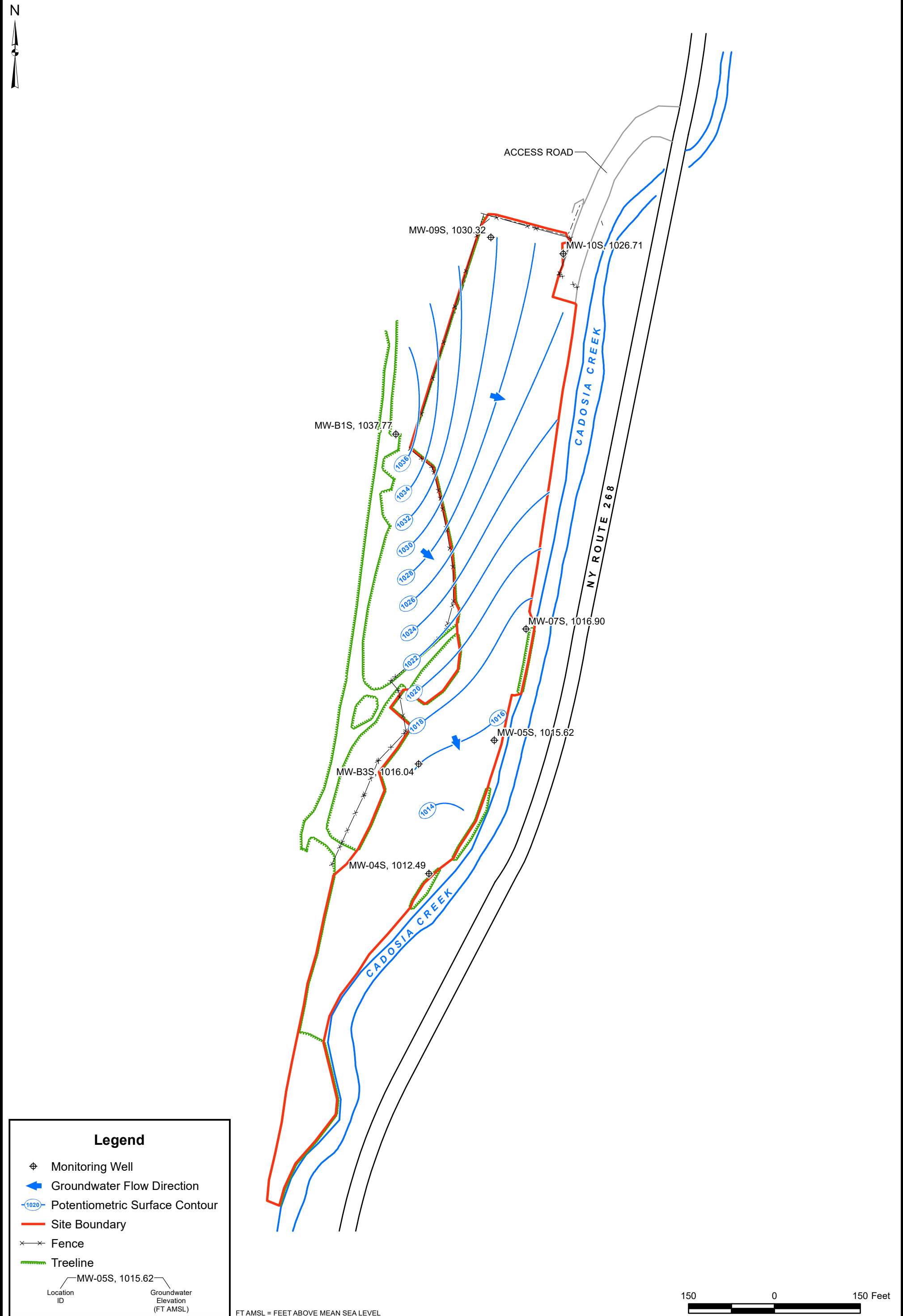
- Areas to be monitored and maintained include:
- Monitoring Wells
 - Access Road
 - Culvert Under Access Road
 - Fence
 - Restored Railroad Embankment
 - Vegetated Area
 - Northern and Southern Rip-Rap Revetments
 - Sheetpile

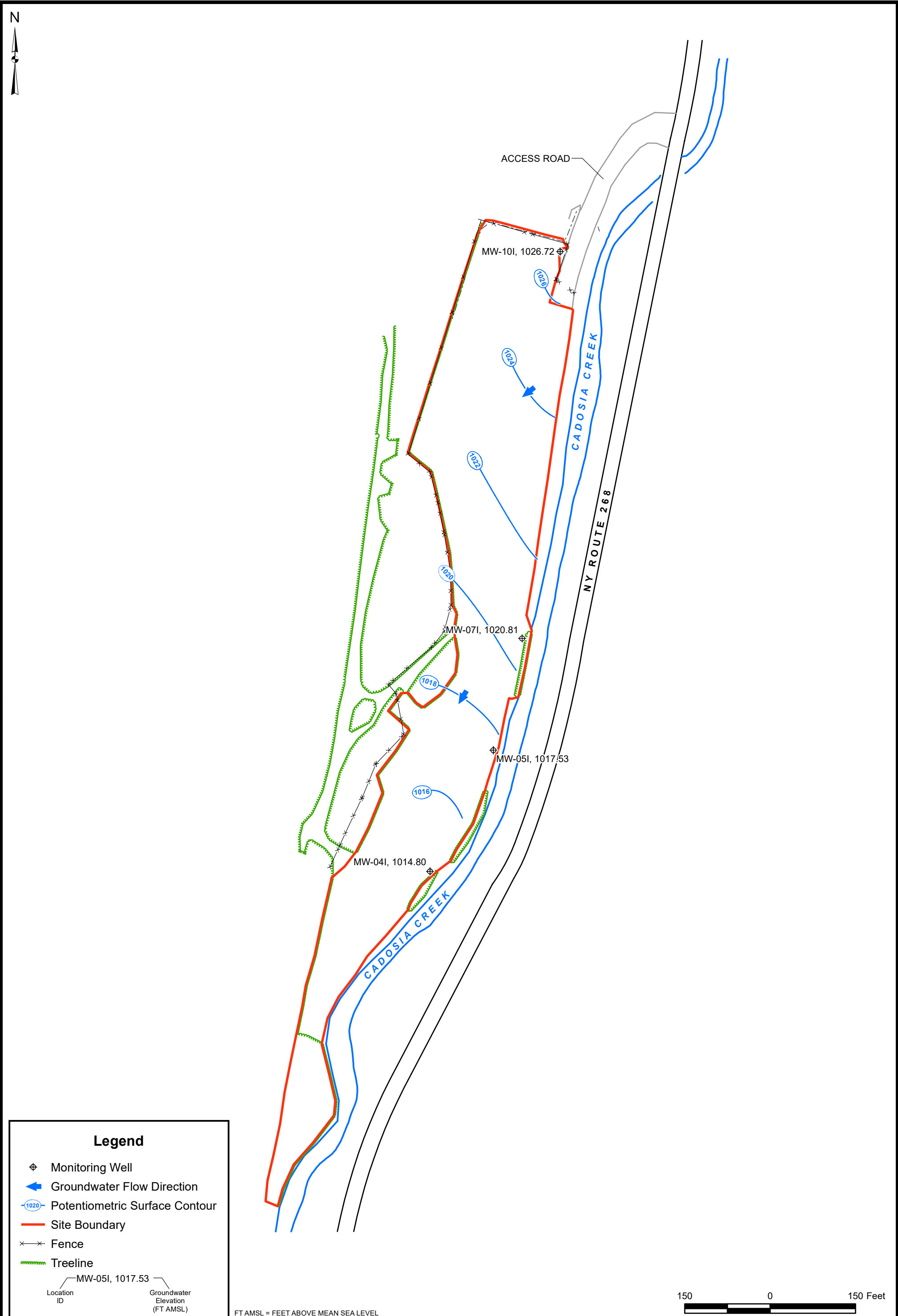
MAP SOURCE:

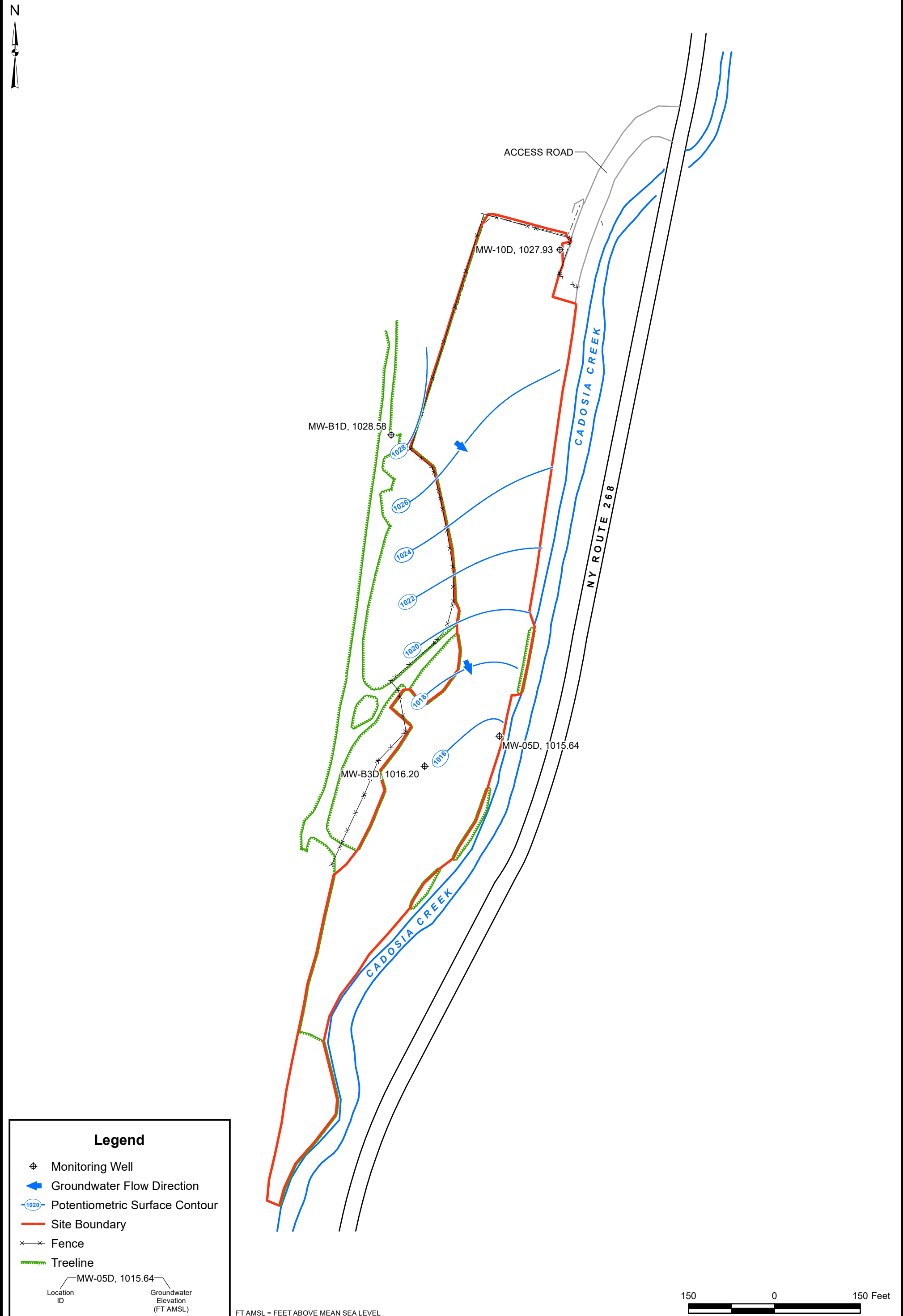
- 1a. Lands of Carme S. Vitale, Jr. and James F. Vitale surveyed by David J. Beers August 1, 1991.
- 1b. Former Kerry Chemical Site, As-Built Survey, Shumaker Consulting Engineering & Land Surveying, P.C., January 3, 2008.

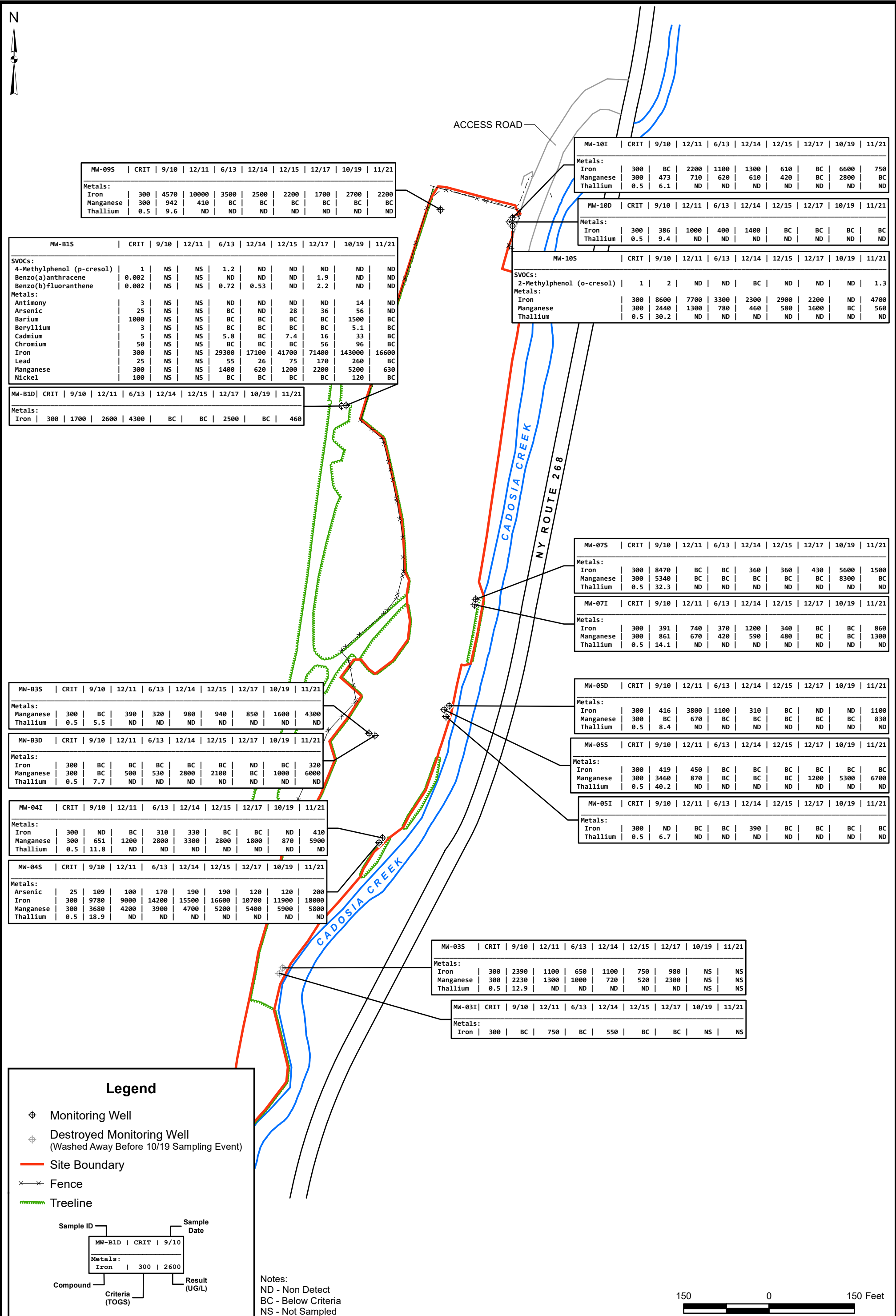
Title:	SITE PLAN	
Location:	KERRY CHEMICAL COMPANY APEX CADOSIA ROAD HANCOCK, NEW YORK	
Client:	NYSDEC	
AECOM AECOM 1 John James Audubon Parkway, Suite 210 Amherst, New York 14228	Drafter: DAD	Date: April 2023
	Drg. Size: 11x17	Job No.: 11174594.00002
FIGURE 2		











APPENDIX A ENVIRONMENTAL NOTICE



Delaware County Clerk
PO Box 426
Delhi, NY 13753

Return to:

CATSKILL MOUNTAIN ABSTRACT
128 TOWNSEND ST.
WALTON, NY 13856

Instrument **Miscellaneous**

Document Number: 145297 **BOOK: 56 PAGE: 93**

First party

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Number of Pages: 6

Recorded Date/Time 09/29/2011 at 1:02 PM

Receipt Number 56212

Note: ** DO NOT REMOVE - THIS PAGE IS PART OF THE DOCUMENT **

THIS PAGE CONSTITUTES THE CLERK'S ENDORSEMENT, REQUIRED BY SECTION 316-a(5) &
319 OF THE REAL PROPERTY LAW OF THE STATE OF NEW YORK.

Sharon A. O'Dell
Sharon A. O'Dell, County Clerk

③ 14.50
3.00
20.00

ENVIRONMENTAL NOTICE

THIS ENVIRONMENTAL NOTICE is made the 9th day of September 2011, by the New York State Department of Environmental Conservation (Department), having an office for the transaction of business at 625 Broadway, Albany, New York 12233

WHEREAS, that parcel of real property located at the address of Apex road, in the Town of Hancock, County of Delaware and State of New York, known and designated on the tax map of the County Clerk of Delaware and Section 417, Block 1 and Lot 15, same as that property conveyed by deed dated March 21, 1950 and recorded in the office of the Delaware County Clerk on March 25, 1950 in book 298 of deeds at page 446. Commencing in the center of the Cadonia Creek County Highway, in the center of the bridge over the Cadonia creek in the Town of Hancock, County of Delaware, State of New York, the property being more particularly described in Metes and Bounds description and attached hereto as Appendix "A" to this notice and made a part hereof, and hereinafter referred to as "the Property" and is the subject of a remedial program performed by the Department; and

WHEREAS, the Department approved a cleanup to address contamination disposed at the Property and such cleanup was conditioned upon certain limitations.

NOW, THEREFORE, the Department provides notice that:

FIRST, the part of lands subject to this Environmental Notice is as shown on a map attached to this Notice as Appendix "B" and made a part hereof.

SECOND, unless prior written approval by the Department or, if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the State and the health of the State's citizens, hereinafter referred to as "the Relevant Agency," is first obtained, where contamination remains at the Property subject to the provisions of the Site Management Plan ("SMP"), there shall be no disturbance or excavation of the Property which threatens the integrity of the engineering controls or which results or may result in a significantly increased threat of harm or damage at any site as a result of exposure to soils. A violation of this provision is a violation of 6 NYCRR 375-1.1 1(b)(2).

THIRD, no person shall disturb, remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls required for the Remedy, including but not limited to those engineering controls described in the SMP and listed below, unless in each instance they first obtain a written waiver of such prohibition from the Department or Relevant Agency.

FOURTH, the remedy was designed to be protective for Commercial or Industrial uses. Therefore, any use for purposes other than Commercial or Industrial uses without the express written waiver of such prohibition by the Relevant Agency may result in a significantly increased threat of harm or damage at any site.

Delaware County Clerk
Document Number 145297
09/29/2011 1:02:50 PM

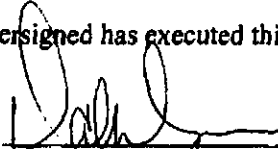


FIFTH, the no person shall use the groundwater underlying the Property without treatment rendering it safe for drinking water or industrial purposes, as appropriate, unless the user first obtains permission to do so from the Department or Relevant Agency. Use of the groundwater without appropriate treatment may result in a significantly increased threat of harm or damage at any site.

SIXTH, it is a violation of 6 NYCRR 375-1.11(b) to use the Property in a manner inconsistent with this environmental notice.

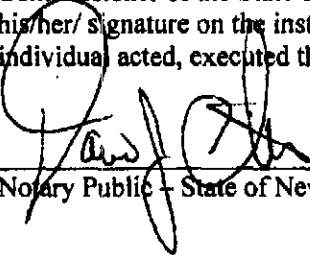
IN WITNESS WHEREOF, the undersigned has executed this instrument the day written below.

By:


Dale A. Desnoyers, Director
Division of Environmental Remediation

STATE OF NEW YORK) ss:
COUNTY OF ALBANY)

On the 9th day of September, in the year 2011, before me, the undersigned, personally appeared Dale Desnoyers, 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. 01CH6082146
Qualified in Schenectady County
Commission Expires August 22, 2014

Kerry Chemical
Apex Road
Delaware County, New York
Tax Map: 417.-1-5

APPENDIX "A"

METES AND BOUNDS DESCRIPTION

ALL THAT CERTAIN PLOT, piece or parcel of land situate, lying and being in the Town of Hancock, County of Delaware and State of New York; being more particularly bounded and described and described as follows:

BEGINNING in the center of the Cadosia Creek County Highway, in the center of the bridge over the Cadosia creek, that runs along the center of said County Highway as it winds and turns about 264 feet to a point in the center of the highway at the northeasterly corner of the large house lot, directly opposite the large maple tree that stands along the western side of the said highway; running thence the following courses and distances:

- 1) Along the northern bounds of the said Esolen lot as surveyed in the year 1946 North 83° West , a distance of 198 feet to a point in the center of the creek; thence
- 2) Along the same, as the creek winds and turn along the west line of said Esolen lot and the west line of the land of Wilfred Fritz until it intersects the easterly line of right of way of New York, Ontario & Western Railway; thence
- 3) Along the same, run northerly along the easterly line of the said right of way as it winds and turns to a point on the said line being the southwest corner of the land of George W. Arnold; thence
- 4) Along the same, run southeasterly along the southwest line of said Arnold lot to a point being 16.5 feet from a point on the east bank of the small creek along the west bounds of the said Arnold house lot; thence
- 5) Along the same, run due south 64.68 feet to the southwest corner of the said Arnold house lot, along the northerly side of a private roadway; thence

- 6) Along the same, run along the southerly line of said Arnold house lot North 83° East and along the northerly side of the roadway 196.35 feet to the southeast corner of said Arnold house lot in the center of the highway; thence
- 7) Along the same, run along the center of the said highway, on a direct line South 7° West 251.46 feet to the place of beginning

18
116.2 ACc

30

16
24.4 ACc

17
6.1.5 ACc

34.1
1.4 ACc

34.2

15
8.5 ACc

ROAD

ROAD

ROAD

ROAD

APEX

31

32

33

34



CATSKILL MOUNTAIN ABSTRACT CORP./BILLABLE A...

P/O TAX MAP # 417

← Z

APPENDIX B RESPONSIBILITIES OF OWNER AND REMEDIAL PART

Responsibilities

The responsibilities for implementing the SMP for the Site, site number 413001, are divided between the Site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:

John Evanitsky (the “owner”).

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party (“RP”) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (“NYSDEC”) is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

NYSDEC, Division of Environmental Remediation, 625 Broadway, Albany, NY 12233.

Nothing on this page shall supersede the provisions of an Environmental Notice, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the Site.

Site Owner’s Responsibilities:

- 1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the Site.
- 2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in the Environmental Notice remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP’s request, in order to allow the RP to include the certification in the Site’s Periodic Review Report (PRR) certification to the NYSDEC.
- 3) In the event the Site is delisted, the owner remains bound by the Environmental Notice and shall submit, upon request by the NYSDEC, a written certification that the Environmental Notice is still in place and has been complied with.
- 4) The owner shall grant access to the Site to the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
- 5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the Site’s RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.

- 6) If some action or inaction by the owner adversely impacts the Site, the owner must notify the Site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and coordinate the performance of necessary corrective actions with the RP.
- 7) The owner must notify the NYSDEC of any change in ownership of the Site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the Site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.
- 8) The RP will perform maintenance activities. The RP remains ultimately responsible for maintaining the engineering controls.

Remedial Party Responsibilities

- 1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.
- 2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.
- 3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.
- 4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).
- 5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system

(Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.

- 6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 - Notifications of the SMP.
- 7) Any change in use, change in ownership, change in site classification (e.g., delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP (NYSDEC) will internally discuss the need to update such documents.

Change in Site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX C LIST OF SITE CONTACTS

<u>Name</u>	<u>Contact Information</u>
Jasmine Stefansky, NYSDEC Project Manager	518-402-9575; jasmine.stefansky@dec.ny.gov
Jeffrey Dyber, NYSDEC Project Manager's Supervisor	518-402-9698; jeffrey.dyber@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	518-402-9569; kelly.lewandowski@dec.ny.gov
Kristin Kulow, NYSDOH Project Manager	607-353-4335; kristin.kulow@health.ny.gov
Arunesh Ghosh, NYSDOH Project Manager	518-402-7860; Arunesh.ghosh@health.ny.gov
Joshua Oliver, EA Project Manager	315-857-5793; joliver@eaest.com

APPENDIX D BORING LOGS AND MONITORING WELL CONSTRUCTION LOGS

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK (518) 783-8102						TEST BORING LOG		BORING NO. MW-1	
PROJECT Kerry Chemical									SHEET 1 OF 4
CLIENT GHR Engineering Associates, Inc.									JOB NO. 2006-3-4632
DRILLING CONTRACTOR Deliz/Elice & Co., Inc.									ELEVATION 1008.4
PURPOSE RI/FS									DATUM MSL
					CASINO	SAMPLE	CORE		
DATE	TIME	DEPTH	CASINO	TYPE		SS	NX	DATE STARTED 11/5/86	
				DIAMETER		3"		DATE FINISHED 11/6/86	
				WEIGHT		140#		DRILLER Paul LeClair	
				FALL		30"		INSPECTOR John S. Munsey	
DEPTH FT.	CASINO BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNITED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION			REMARKS
5		S-1	3	SM		Dk br c(-)mfS, l(-)Cy\$, l(+) mfG			Rec=1.8 Damp Top .5 Organic
			5						
			12						
			15						
		S-2	6	SM		Dk Gnbr cmfS, l Cy\$, l(+) mfG; mtld ywbr			Rec=1.2 Moist/WET @ 3.5'
			12						
			18						
			14						
		S-3	45	GP		Dk Rdbr mfG a, cmfS, l Cy\$; mtld ywbr (FLUVIAL) (fining upward sequence)			11/6/86 Rec=1.3 WET
			55						
			28						
			25						
		S-4	15	ML/ SM		Dk Rdbr Cy\$ a, mfS, l(-)m(-)fG (TILL SEQUENCE)			Rec=1.6' WET
			45						
			120						
			boulder						
10						9.8'			

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK				TEST BORING LOG		BORING NO. MW-1		
PROJECT Kerry Chemical						SHEET 2 OF 4		
CLIENT GHR Engineering Associates, Inc.						JOB NO. 2006-3-4632		
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS	
15		S-5	48	ML/ SM		Rdbr Cy\$ a(+), cmf S, s cmf G; cbl fgmt; mtld	Rec=1.4' WET	
			74					
			126					
		S-6	60	GM		Rd br cmfG a, c(-)mfS, l(+)Cy\$	Rec=1.0' WET	
			120					
							13.7'	Spoon bounces @ 14.0'
		S-7	200/.3	ML/ SM	Rdbr Cy\$ a(+), cmfS, smfG <u>Red brown CLAYEY SILT and(+), Coarse to fine Sand, some medium to fine Gravel.</u>	Rec=.3' WET		
		S-8	100/.2			Rec=0 Drill water turns rdbr @ 18.5'		
20		S-9	150/.3				Rec=0 green wash	
					(TILL SEQUENCE) 21.0'			
					Bedrock			

[illegible]

[illegible]

Dunn Geoscience Corporation

Core Log

Client GHR Engineering Associates, Inc.
 Project Kerry Chemical
 Location 2006-3-4632

Logged by John S. Munsey Date Logged 11/6/86
 Drilling Co. Deliz/Elice & Co., Inc.
 Driller Paul LeClair
 Started _____ Finished _____

Hole MM-1
 Depth 26.0' - 36.0'
 Elev. 1008.4
 Core Dia. NY

Member	Zone/Unit	Graphic Log 1" = 5'	Depth	Descriptive Log			Angle of Bedding to Core	% Core Recovery
				ROCK TYPE: color; grain size; texture; bedding; minerals; remarks, etc				
				TOP OF CORE 26.0'				
				Run 1: 26.0 - 31.0' Penetration: 5.0' Rec=5.0' % Rec=100% RQD=54%			15°	100%
				LT Gngr SANDSTONE, medium grained, 15° bedding planes with horizontal laminated iron stained fractures, occasional clay seams				
				D-1, S-2, F-3 to F-4				
			30					
				Run 2: 31.0 - 36.0' Penetration: 5.0' Rec=4.6' % Rec=92% RQD=60%				92%
				Same as Run 1				
			35					
				Bottom of Core 36.0'				

GEOSCIENCE CORPORATION

MAN, NEW YORK (516) 783-8102

TEST BORING LOG

BORING NO.

MW-2

CLIENT Kerry Chemical

ENGINEER GHR Engineering Associates, Inc.

SHEET 1 OF 3

DRILLING CONTRACTOR Deliz/Elice & Co., Inc.

JOB NO. 2006-3-4632

TEST TYPE RI/FS

ELEVATION 1027.3

GROUNDWATER

CASING

SAMPLE

CORE

DATUM MSL

DATE

TIME

DEPTH

CASING

TYPE

SS

DATE STARTED 11/8/86

DIAMETER

3"

DATE FINISHED 11/8/86

WEIGHT

140#

DRILLER Wayne Ryman

FALL

30"

INSPECTOR Joe Salvetti

DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
5		S-1	8	SP		Dk Br mfs, tCy\$, 1 cmf G; graded to Rdbr fs, t Cy\$	Rec=1.3
			11			<u>Dark brown medium to fine SAND, trace Clayey Silt, little coarse to fine Gravel; graded to Red brown fine SAND, trace Clayey Silt.</u>	
			7				
			12				
		S-2	30	ML		Rdbr Cy\$ a, fs, a mfG	Rec=1.1
	32						
	100/.2						
10						(GLACIAL ICE-CONTACT)	

DUNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-2

PROJECT Kerry Chemical

SHEET 2 OF 3

CLIENT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON. PER 6"	UNIFIED CLASS- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
15				ML		Brrd Cy\$ a, cG; grading to Br fS, 1 Cy\$	Rec=1.0
			13				
		S-3	82				
			28				
			60				
				SP		Brrd fS, 1 Cy\$; cbl fgmt <u>Brown red fine SAND, little Clayey Silt; cobble fragment</u>	Rec=1.0
		S-4	46				
			48				
			100				
20				SW		Rdbr c(-)mf(+)S, t Cy\$, 1 cmf G	Rec=1.3
		S-5	40				
			50				
						(GLACIAL ICE-CONTACT)	

[illegible]

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK (518) 783-8102				TEST BORING LOG			BORING NO. MW-3I	
PROJECT Kerry Chemical							SHEET 1 OF 8	
CLIENT GHR Engineering Associates, Inc.							JOB NO. 2006-3-4632	
DRILLING CONTRACTOR Deliz/Elice & Co., Inc.							ELEVATION 1013.6	
PURPOSE RI/FS							DATUM MSL	
GROUNDWATER				CASING	SAMPLE	CORE	DATE STARTED 11/12/86	
DATE	TIME	DEPTH	CASING	TYPE		SS	DATE FINISHED 11/14/86	
				DIAMETER		3"	DRILLER Paul LeClair	
				WEIGHT		140#	INSPECTOR J. Munsey, W. How	
				FALL		30"		

DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
5		S-1	2	SW		Lt br c(-)mf S, t Cy\$, 1 mf G; rts	Rec=1.6 Top 1.0' Organic Damp
			3				
			3				
			3				
		S-2	14				
6							
5							
3							
10						(FLUVIAL)	

ROSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-3I

Harry Chemical

SHEET 2 OF 8

Engineering Associates, Inc.

JOB NO. 2006-3-4632

	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
	S-3a	19	GP/GM		Gnbr mfG a(-), cmfS, 1 Cy\$	Rec=2.0 WET
		16				
		22			(FLUVIAL) 11.5'	
	S-3b	30	SP		Ltbr mfS, tCy\$ <u>Light brown medium to fine SAND, little Clayey Silt.</u>	
					(GLACIO-LACUSTRINE) 13.5'	
					inferred	"boney" drilling @ 13.5'
15	S-4	38	GP/GM		Gnbr mfG a(-), cmf S, 1 Cy\$; lyr mfS, tCy\$	Rec=1.2 WET
		96				End of samples taken from MW-3S; begin sampling from MW-3I.
		100/.2				Inspector: Walter Howard
20	S-5	73	GM/GP		Rd br cmfG a, mfS, s \$&C; cbl fgmts.	Rec=1.3 Moist
		75			<u>Red brown coarse to fine GRAVEL and, medium to fine SAND, some Silt and Clay.</u>	Till HNU=5.0
		100/.4				
					(TILL SEQUENCE)	

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-3I	
PROJECT Kerry Chemical								SHEET 3 OF 8	
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASS- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
25		S-6		GM/ GP		Do	(TILL SEQUENCE)	27.0'	Rec=1.3 Moist Till HNU=6.0
30		S-7	19	SP/ SM		Brdd c(-)mf(+)S, s\$ <u>Brown red coarse(-) to fine(+) SAND,</u> <u>some Silt.</u>		Started easier drilling @ 27.0'	
(GLACIO-LACUSTRINE)									

INN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-3I

JECT Kerry Chemical

SHEET 4 OF 8

NT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
35	S-8		SP/ SM		Br rd mf S, s \$	Rec=1.4 WET HNU=ND Very Easy Drilling
		15				
		26				
		32				
		55				
40	S-9	15	SP/ SM		Br rd mf(+)S, s\$ <u>Brown red medium to fine(+)SAND,</u> <u>some Silt</u>	Rec=1.7 WET HNU=ND Very Easy Drilling
		22				
		32				
		38				
45	S-10	14	SP/ SM		Do (GLACIO-LACUSTRINE)	Rec=1.2' Moist
		25				

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK				TEST BORING LOG		BORING NO. MW-3I					
PROJECT Kerry Chemical				SHEET 5 OF 8							
CLIENT GHR Engineering Associates, Inc.				JOB NO. 2006-3-4632							
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASS- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS				
50		S-10	40	ML		Rd br \$ a (+), f S; .1 lyr \$ <u>Red brown Silt and(+), fine Sand,</u> <u>.1 layer Silt.</u>	Rec=1.2' Moist Flowing water for 5 min.				
			100/.3								
		S-11	14								
			24								
	75										
	100/.2										
55		S-12	14					SP/ SM		Br mf(+)'S, s\$	Rec=1.6' WET at 56' into small artesian flow which lasted 15 min.
			24								
			26								
			50								

(GLACIOLACUSTRINE)

IN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-3I

BY Kerry Chemical

SHEET 6 OF 8

BY GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

TESTING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
60	S-13	6	ML		Br rd \$ s, fS	Rec=1.2' Moist
		18				
		30				
		82				
	S-14	12	ML		Br rd \$ l(-), f S <u>Brown red SILT little(-), fine Sand</u>	Rec=1.4' Damp Driller notes slightly har- der drilling @ 68'
65		20				
		55				
		100/.4				
70					(GLACIO-LACUSTRINE)	

DUNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-3I

PROJECT Kerry Chemical

SHEET 7 OF 8

CLIENT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
70		S-15	13	ML		Do	Rec=1.4' Damp
			20				
			45				
			85				
							-73.5' Driller says roller bit and casing drilled tight had 1.5' of wash in hole. Driller washed out hole.
75		S-16	16	ML		Br rd Cy\$ <u>Brown red CLAYEY SILT.</u>	Rec=2.0' Damp
			26				
			42				
			115				
						(GLACIO-LACUSTRINE)	78' Driller notes much harder drill- ing
						78.0'	
80							81' wash turned grey
						(Bedrock)	

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK (516) 783-8102					TEST BORING LOG			BORING NO. MW-4I			
PROJECT Kerry Chemical								SHEET 1 OF 5			
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632			
DRILLING CONTRACTOR Deliz/Elice & Co. Inc.								ELEVATION 1016.9			
PURPOSE RI/FS								DATE STARTED 11/10/86			
GROUNDWATER					CASING	SAMPLE	CORE	DATE FINISHED 11/14/86			
DATE	TIME	DEPTH	CASING	TYPE		SS		DRILLER Paul LeClair			
				DIAMETER		3"		INSPECTOR Gordon M. Steven			
				WEIGHT		140#					
				FALL		30"					
DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS			
5		S-1	3	SW		Br c(+)mf(-)S, r(-)\$, sc(-)mf(+)G; cbl fgmt; rts <u>Brown coarse(+) to fine SAND, trace</u> <u>(-)Silt, some coarse(-) to fine(+)</u> <u>Gravel; cobble fragment; roots.</u>		Rec=1.5' Damp upper .5 organ- ic			
			5								
			6								
			8								
	10		S-2			32			cbl fgmt		Rec=.1
		22									
		26									
		40									
						8.4'					
						Boulder					
						(FLUVIAL)		9.5'			
						(GLACIO-LACUSTRINE)		inferred			

INN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-4I

JECT Kerry Chemical

SHEET 2 OF 5

ENT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
15	S-3	20	SP		Gngr fS, s\$; seam vvd Cy\$ <u>Green gray fine SAND, some Silt; seam varved Clayey Silt.</u>	Rec=.8 WET
		13				
		14				
		20				
						Cobble @ 14.8 - 15.8'
	S-4	10	SP		Gngr mfS, t\$; cbl fgmt	Rec=.8 WET
		12				
		18				
		28				
					(GLACIO-LACUSTRINE) 18.0' inferred	18' harder drilling Brrd wash
20		100	SM		Rdbr c(-)mf(+)S, lCy\$, lcmf(+)G; cbl fgmt <u>Red brown coarse(-) to fine SAND, little Clayey Silt, little coarse to fine (+) Gravel; cobble fragment.</u>	Rec=.5 Moist TILL
		96				

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-4I	
PROJECT Kerry Chemical								SHEET 3 OF 5	
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
25									
30									
		S-6	75	SW/ SM	Br c(-)mf(+)S, lCy\$, lmf(+)G; lyr Cy\$		spoon tried refusal (No Rec.)		
			100/.3						
					<u>Brown coarse (-) to fine(+) SAND, little Clayey Silt, little medium to fine(+) Gravel; layer Clayey Silt.</u>		Rec=.5 Moist		

(TILL. SEQUENCE)

[illegible]

IN GEOSCIENCE CORPORATION LATHAM, NEW YORK (518) 783-8102				TEST BORING LOG			BORING NO. MW-5D	
PROJECT Kerry Chemical							SHEET 1 OF 8	
CLIENT GHR Engineering Associates, Inc.							JOB NO. 2006-3-4632	
INSTALLING CONTRACTOR Deliz/Elice & Co., Inc.							ELEVATION 1018.5	
PURPOSE RI/FS							DATUM NSL	
GROUNDWATER				CASING	SAMPLE	CORE	DATE STARTED 10/23/86	
DATE	TIME	DEPTH	CASING	TYPE		SS	DATE FINISHED 11/3/86	
				DIAMETER		3"	DRILLER Paul LeClair	
				WEIGHT		140#	INSPECTOR John S. Munsev	
				FALL		30"		
DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS
5		S-1	1	SP		Br mfS, t Cy\$, 1 mfG; tar fgmts	Rec=1.2 Damp Tar Odor Top .2 Organic	
			4					
			6					
			8					
		S-2	8	SP/ SM		Br mf(+)S, 1Cy\$, 1 mf G; cndrs	Rec=1.1 Damp Tary sands	
			3					
			4					
			12					
		S-3	18	SW		Dk Brgr cmfS, t Cy\$, S mf G; Tar granules	Rec=1.5 Moist/WET @ 5.5	
			30					
			32					
			30					
	S-4	15	GP	Dkgr mfG a, cmf S, 1 Cy\$ <u>Dark gray medium to fine GRAVEL and, coarse to fine Sand, little Clayey Silt.</u>	Rec=1.5 WET			
		22						
		22						
		16						
10	S-5	24	GP	DO	Rec=1.3 WET Strong tar odor			
		16						
		10						
		13						
						Br mf(+)S, 1(-) Cy\$ (GLACIO-LACUSTRINE)		

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK				TEST BORING LOG		BORING NO. MW-5D	
PROJECT Kerry Chemical						SHEET 2 OF 8	
CLIENT GHR Engineering Associates, Inc.						JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
15		S-6	9	SP		DO	Rec=1.4 WET
			6				
			9				
			15				
		S-7	42			(GLACIO-LACUSTRINE) 12.0	Rec=.9 WET
			62/.4			C(+) mf S, tCy\$, s m(-)f G; gravel increases w/depth	
						12.9	begin tricone
20		S-8	100/.4	SM		Boulder	10/27/86 Grout 6"x10' PVC casing (0 - 10')
		S-9	100/.3			Br f S, a Cy\$, s mfG	10/28/86 Rec.3 Moist (TILL)
					<u>Brown fine Sand, and Clayey Silt,</u>		
				<u>some medium to fine Gravel</u>			
						(TILL SEQUENCE)	

BORING NO. MW-5D

SHEET 3 OF 8

JOB NO. 2006-3-4632

30

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-5D	
PROJECT Kerry Chemical								SHEET 4 OF 8	
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS		
35		S-16	116	SM		DO	Rec=.5 Moist		
			100/.2						
		S-17	150/.2			DO	Rec=.2 Moist		
40									
		S-18	70			DO	Rec=.3 Moist		
			110/.3			<u>Brown fine Sand, and Clayey Silt,</u> <u>some medium to fine Gravel</u>			
		S-19	75			DO	10/29/86 Rec=.5 Moist		
			100/.4						
		S-20	74			DO	Rec=.25 Moist		
			100/.25						
	S-21	85	DO			Rec=.1 Moist			
		200/.3							

(TILL SEQUENCE)

BORING NO. MW-5D

SHEET 5 OF 8

JOS NO. 2006-3-4632

(TILL SEQUENCE)

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK				TEST BORING LOG		BORING NO. MW-5D	
PROJECT Kerry Chemical						SHEET 6 OF 8	
CLIENT GHR Engineering Associates, Inc.						JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
60		S-28	185	SM		DO	Rec=.4 Moist
			100/.2				
		S-29	100			DO	10/29/86 Rec=.9 Moist
			100/.2			<u>Brown fine Sand, and Clayey Silt, some medium to fine Gravel</u>	
65		S-30	120	SM		DO	Rec=.5 Moist
		S-31	220			DO	Rec=.2 Moist
		S-32	75			(TILL SEQUENCE) 66.0'	Rec=.9 Moist rounded clusts
			100/.4			Br cmfS, s Cy\$, a (-) mf G <u>Brown coarse to fine Sand, some Clayey Silt, and (-) medium to fine Gravel.</u>	
		S-33	45	SM/ SW		Br cmf S, 1 Cy\$, 1 mf G	Rec=1.0 WET
			52				
			69				
			100/.3				
						(GLACIAL ICE-CONTACT)	

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK				TEST BORING LOG		BORING NO. MW-5D	
PROJECT Kerry Chemical						SHEET 7 OF 8	
CLIENT GHR Engineering Associates, Inc.						JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
75		S-34	76	SW/ GP		Br C(-)mf(+)S, t Cy\$, 1(+) mf G grading to cmG	Rec=.7 Wet
			139/.4				
		S-35	32	ML		(GLACIAL ICE-CONTACT) 72.0' Br Cy\$ s(+), f S; vvd inferred	10/31/86 Rec=1.3 WET
			64				
			100/.3				
		S-36	32	ML/ SP		DO; mfs lns	Rec=1.3 WET
			64				
			100/.4				
		S-37	39	ML		Br Cy\$ t(-), f S <u>Brown CLAYEY SILT trace(-), fine Sand</u>	Rec=1.0 WET
			121				
	S-38	30	ML		DO	Rec=1.2 WET	
		52					
		120					
	S-39	38	ML/ SM		DO; lyrs c(-)mfS, 1 Cy\$	Rec=1.2 WET	
		71					
		100/.2					
						(GLACIO-LACUSTRINE)	

DUNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-5D

PROJECT Kerry Chemical

SHEET 8 OF 8

CLIENT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNITED CLASS- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
85		A S-40	30			Br mf(+)S, 1' Cy\$; vvd	Rec=1.0
		B	120			(GLACIO-LACUSTRINE) 82.8'	WET
						Br cmf S, s \$&C, a mfG	11/3/86
		S-41	72			Br mf G s(+), c(+)mf(-)S, t(-) Cy\$	Rec=.6
			100/.2				Subrounded
						Brown medium to fine GRAVEL some	clasts
						(+), coarse(+) to fine(-) Sand,	
						t(-) Clayey Silt	
		S-42	100/.2			(GLACIAL ICE-CONTACT) 86.1'	Rec=0
90						Bedrock	Wash
		S-43	120/.2				Rec=0
							(Wash)
							Tricone to
							94'
94						94.0'	
						Bottom of Boring	

DUNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK (516) 783-8102

TEST BORING LOG

BORING NO. MW-6D

PROJECT Kerry Chemical

CLIENT GHR Engineering Associates, Inc.

SHEET 1 OF 9

DRILLING CONTRACTOR Deliz/Elice & Co., Inc.

JOB NO. 2006-3-4632

PURPOSE RI/FS

ELEVATION 1035.2

GROUNDWATER

CASING

SAMPLE

CORE

DATUM MSL

DATE	TIME	DEPTH	CASING	TYPE		SS		DATE STARTED	10/15/86
				DIAMETER		3"		DATE FINISHED	10/21/86
				WEIGHT		140#		DRILLER	Wayne Ryman
				FALL		30"		INSPECTOR	Gordon M. Stevens

DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS	
5		S-1	4	ML		Br Cy\$ t(-), mf S, t cmG; stratified \$ parts	Rec=1.9 top .5 organic	
			9			<u>Brown CLAYEY SILT trace(-), medium to fine Sand, trace coarse to medium Gravel; stratified Silt partings.</u>		
			14					
			30					
							2.0'	
						Boulder		
						gn sandstone	3.4'	
		S-2	10				4.5'	Rec=0
			50/0					
						Boulder	5.5'	
		S-3	50	GW		Cbl fgmt; cmf(+)Gl, c(+) mf S, t Cy\$	Rec=.9 WET	
			39			<u>Cobble fragment; coarse to fine (+)</u>		
			34			<u>Gravel little, coarse (+) to fine Sand, trace Clayey Silt.</u>		
			25					
						(GLACIAL ICE-CONTACT)	8.0'	Rec=1.9 Moist Compact Till Like
		S-4	20	GW/ GM		Br cmf G a, cmf S, t Cy\$; cbl fgmts		
	20							
	36							
	50/.4							
10					(TILL SEQUENCE)			

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK					TEST BORING LOG		BORING NO. MW-6D				
PROJECT Kerry Chemical							SHEET 2 OF 9				
CLIENT GHR Engineering Associates, Inc.							JOB NO. 2006-3-4632				
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS			
15		S-5	62	GW/ GM		DO; occ lyr Br c(+)mfS, t\$, a cmf(+)G		Rec=2.0 Till Like Moist			
			36								
			42								
			49								
		S-6	25	GW/ GM				DO		Rec=1.2 Moist	
			92								
			81								
			36								
		S-7	35	GW/ GM				DO		Rec=1.7 Moist	
			31								
			34								
			54								
20		S-8	25	SW	(TILL SEQUENCE) 16.0' inferred	Br cmf(+)S, tCy\$, s cmfG	Rec=1.2 Moist/WET				
			21								
			18								
			17								
		S-9	12	SW			DO; fining downward to cmf(+)S, 1\$, l(-)mfG	Rec=1.4 WET			
			17								
			20								
			21								
		S-10	8	SW			DO		Rec=2.0 WET Till, Moist		
			24								
			46								
			46								
22						(GLACIAL ICE-CONTACT) 21.8' Rdbr mfS, l(-)Cy\$, 1 cmf (+)G (TILL SEQUENCE)					

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK					TEST BORING LOG		BORING NO. MW-6D	
PROJECT Kerry Chemical							SHEET 3 OF 9	
CLIENT GHR Engineering Associates, Inc.							JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASS- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS	
25		S-11	12	SM		Br cmf(+)S, tCy\$, lmfG	Rec=.7 WET	
			100/.3					
		S-12	57			Cbl. Fgmt.	Rec=.1	
			59					
			71					
			100/.4					
		S-13	100/.2			Cbl. Fgmt.	Rec=.1	
		S-14	35	SM		Brrd mf S, 1 Cy\$, 1 mf(+)G Brown red medium to fine SAND, little Clayey Silt, little medium to fine (+) Gravel.	Rec=1.0 Till Moist	
	51							
	54							
	56							
30		S-15	22	SM	DO; cbl fgmts	Rec=1.0 Damp HNU=0.3		
			25					
			65					
			100/.2					
		S-16	88				Cbl. fgmt.	Rec=.2
			100/.4					
34								

(TILL SEQUENCE)

DUNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-6D

PROJECT Kerry Chemical

SHEET 4 OF 9

CLIENT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

Engineering Associates, Inc.						JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON. PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
35		S-17	56	SM		Rdbr cmf(+)S, l(+)Cy\$, S(-)cmfG Red brown coarse to fine(+) SAND, <u>little(+)Clayey Silt, some(-)coarse to fine Gravel.</u>	Rec=1.0 Porous HNU=165 Moist
			100				
		S-18	62	ML	Rdbr cmf(+)S, l(+)Cy\$, s(+)cfG; cbl fgmt.	Rec=1.4 Moist HNU=10.2	
			92				
			100/.4				
	40		S-19	56	ML	DO; cbl fgmts; 1/16" prts	Rec=1.4 HNU=11.5 Moist
				56			
		100/.4					
		S-20	56	SM/ SP	Rdbr mfS, t(+)Cy\$, a cmf(+)G	Rec=1.6 HNU=11.0 Moist	
			52				
			90				
			100/.2				
45			S-21	87	SW	Rdbr cmf(+)S, tCy\$, a cmfG; cbl fgmts.	Rec=1.5 Moist/WET HNU=12.5
		100					
		122					
		S-22		SW	Rd br cmfS, tCy\$, a cmfG; cbl fgmts; stratified 1/16" prts occ lyr c(+)mfS, t\$, lmf(+)G	Rec=1.5 WET HNU=325 ppm	

DUNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-6D

PROJECT Kerry Chemical

SHEET 5 OF 9

CLIENT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASS- IFICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
50		S-23	26	SM		Rdbr mfs, 1(+)Cy\$, 1cmf(+)G <u>Red brown medium to fine SAND,</u> <u>little (+)Clayey Silt, little</u> <u>coarse to fine (+)Gravel.</u>	Rec=1.5 HNU=11.0 Till Like Moist
			27				
			27				
			72				
		S-24	100/.4	SM		DO; cbl fgmt	Rec=.4 HNU=1.2 Moist
		S-25	6	SM		DO	Rec=1.2 Moist HNU=12
			9				
			30				
			81				
		S-26	100/.4	SM		DO	Rec=.5 Moist HNU=13
55		----	100/.5			No Sample Recovered	Rec=0
		S-27	97	SM		DO	Rec=1.3 Moist HNU=13
			74				
			84				
			100/.4				
					(TILL SEQUENCE)		

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-6D			
PROJECT Kerry Chemical								SHEET 6 OF 9			
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632			
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNITED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS			
60		S-28	56	SM		Rdbr cmf(+)S, l(-)Cy\$, S(+) cmf G <u>Red brown coarse to fine(+) SAND,</u> <u>little(-) Clayey Silt, some (+)</u> <u>coarse to fine Gravel</u>	DO	Rec=1.1 HNU=13 Moist			
			37								
			100/.3								
			S-29	80					SM	DO	Rec=2.0 Moist HNU=5.0
				73							
				64							
									S-30		
65			33	SM	Rdbr f S, a(-)Cy\$, a(-)mfG <u>Red brown fine Sand, and(-) Clayey</u> <u>Silt, and(-)medium to fine Gravel.</u>	DO	10/20/86 Rec=1.2 Moist HNU=0				
			105								
			100/.3								
				S-31				15	SM		
								27			
								78			
				100/.4				SM	Rdbr fS, a Cy\$, S(-)mf G <u>Red brown fine Sand, and Clayey</u> <u>Silt, some(-) medium to fine Gravel.</u>	Change to standard sampling @ 68.0'	
								S-32			56
				150/.4							

(TILL SEQUENCE)

GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-60

Kerry Chemical

SHEET 7 OF 9

GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS 'Standard'
	S-33	68	SM		Brrd cmf(+)S, 1(-)Cy\$, 1 cmf(+)G	Rec=.8 HNU=1 Moist
		100/.3				
	S-34	76	SM		Brrd cmf(+)S, 1(-)Cy\$, 1 cmf(+)G	Rec=.7 HNU=0 Moist
		111				
	S-35	58	SM	DO		Rec=.6 HNU= 0 Moist
		150/.3				
(TILL SEQUENCE)						

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-6D	
PROJECT Kerry Chemical								SHEET 8 OF 9	
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNITED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
85		S-36		SM		DO			Rec=.5 HNU= 0 Moist
90		S-37	119	GW		Gnbr cmf(+)Ga, c(+)mfS, t\$			Rec=.6 WET
			100/.2						
	(TILL SEQUENCE)						88.0'	Driller noted a possible change at 88'	
(GLACIAL ICE-CONTACT)									

BORING NO. MW-6D

SHEET 9 OF 9

JOB NO. 2006-3-4632

[illegible]

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK (518) 783-8102					TEST BORING LOG			BORING NO. MW=7I		
PROJECT Kerry Chemical								SHEET 1 OF 5		
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632		
DRILLING CONTRACTOR Deliz/Elice & Co., Inc.								ELEVATION 1024.0		
PURPOSE RI/FS								DATUM MSL		
GROUNDWATER					CASING	SAMPLE	CORE			
DATE	TIME	DEPTH	CASING	TYPE		SS		DATE STARTED 11/4/86		
				DIAMETER		3"		DATE FINISHED 11/5/86		
				WEIGHT		140#		DRILLER Wayne Ryman		
				FALL		30"		INSPECTOR Gordon M. Stevens		
DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION			REMARKS	
5		S-1	4	SW		Dkbr 0 cmfs, tCy\$, lcmfG; cbl fgmts, cndrs; rts, charcoal <u>Dark brown organic coarse to fine SAND; trace Clayey Silt, little coarse to fine Gravel; cobble frag- ments; cinders; roots, charcoal.</u>			Rec=1.5 Damp (FILL) Sample 1 & 2 taken at MW-7S location. Tars found in 7I boring while placing 6" PVC.	
			6							
			9							
			3							
10		S-2	28	SW		DO; tarlike smell no obvious tar			Rec=2.0 HNU=amb WET	
			43							
			42							
			52							
						(FILL) 9.0'				
						(FLUVIAL) inferred				

BORING NO. MW-7I

SHEET 2 OF 5

JOB NO. 2006-3-4632

20

BORING NO. MW-7I

SHEET 3 OF 5

JOB NO. 2006-3-4632

Soil Engineering Associates, Inc.

JOB NO. 2006-3-4632

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS	
25		S-6		SP		Br fs, s(-)\$, Faint strat. <u>Brown fine SAND, some(-)Silt; faint stratification</u>	Harder drill- ing at 23' rd wash	
30		S-6	18	SP			Soft @ 25.5' Br wash	
							49	Rec=1.9' WET
							72	
							100/.4	
				SM		----- (GLACIO-LACUSTRINE) ----- 30.0'	hard drilling @ 30'	
	S-7	53	SM			Rec=.7 Moist		
							97	

(TILL SEQUENCE)

GEO SCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-71	
PROJECT Kerry Chemical								SHEET 4 OF 5	
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632	
	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
35									
		S-8	100/.4	SM		DO; cbl fgmt		Rec=.2	
40									
		S-9	150/.4	SM		<u>Rdbr cmf(+)S, s(+)Cy\$, a(-)c(-)mf G Red brown coarse to fine (+) Sand,</u> <u>some (+) Clayey Silt, and (-)</u> <u>coarse to fine(+) Gravel.</u>		Rec=.2	
45									

(TILL SEQUENCE)

[illegible]

GEOSCIENCE CORPORATION ATHAM, NEW YORK (518) 783-8102				TEST BORING LOG			BORING NO. MW-8I		
PROJECT Kerry Chemical							SHEET 1 OF 6		
CLIENT GHR Engineering Associates, Inc.							JOB NO. 2006-3-4632		
DRILLING CONTRACTOR Deliz/Elice & Associates, Inc.							ELEVATION 1033.41		
PURPOSE RI/FS							OATUM MSL		
WATER				CASING	SAMPLE	CORE	DATE STARTED 11/7/86		
DATE	TIME	DEPTH	CASING	TYPE		SS	DATE FINISHED 11/8/86		
				DIAMETER		3"	DRILLER Wayne Ryman		
				WEIGHT		140#	INSPECTOR Gordon M. Stevens		
				FALL		30"			
DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
5		S-1	2	SM- SW		Br cmf(+)S, 1Cy\$, s(+)cmfG; cbl fgmt; rts		Rec=1.8 Damp	
			9			Brown coarse to fine (+) SAND, little Clayey Silt, some (+) coarse to fine			
			12			Gravel; cobble fragments, roots.			
			24						
10		S-2	51	SM/ SW		DO		Rec=2.0 Damp	
			47						
			53						
			67						
						(GLACIAL ICE-CONTACT)			

GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-81

Kerry Chemical

SHEET 3 OF 6

GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

FEET	BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS		
25		S-4	51	SW/SP		Cbl fgmts	Rec=.4 Small tilly glob.		
			54						
30		S-5	100/.4						
		S-6	70				Br cmf(+)S, t\$, a(-)cmf(+)G; cbl fgmt <u>Brown coarse to fine(+) SAND, trace Silt, and (-) coarse to fine (+) Gravel.</u>	Rec=1.0 WET	
			62						
			100/.3						
(GLACIAL ICE-CONTACT)									

[illegible]

DUNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-81

PROJECT Kerry Chemical

SHEET 6 OF 6

CLIENT GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNITED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
60						(GLACIO- LACUSTRINE)	Soft drilling @ 58 - 59'
						60.5'	
						Bedrock	Spoon bounced.
							Hard drilling.
65							
			100/.3			65.5'	
						Bottom of Boring	Water flowing
						Weathered shaley sandstone	from casing w/ air bubbles 2'+ head before benton- ite seal was placed.
70							

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-8	
PROJECT Kerry Chemical								SHEET 2 OF 6	
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6	UNIFIED CLASS- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
15		S-3		SP		10.5'			
			Boulder						
20		S-3	62	SP		Br mf(+)S, t\$; cbl fgmts		Rec=1.0 WET	
			110			<u>Brown medium to fine(+) SAND, trace Silt; cobble fragments.</u>			
								Very soft from 19.5 to 20.5'	
		S-4	64	SP		Br fS, t\$; cmfG; cbl fgmts		Rec=1.6 WET	
			80						
(GLACIAL ICE-CONTACT)									

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK						TEST BORING LOG		BORING NO. MW-8	
PROJECT Kerry Chemical								SHEET 4 OF 6	
CLIENT GHR Engineering Associates, Inc.								JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
35						Br cmf(+) S, s(-)\$, s(+)c(-)mf(+)G; cbl fgmts <u>Brown coarse to fine (+) Sand, some (-) Silt, some (+) coarse (-) to fine (+) Gravel.</u>		Rec=.9 WET	
		S-7	73	SP/					
			100/.4	SM					
40						Br cmfS, t\$, c(-)mfG 41.5' Rd br mf(+)S, t\$, mf(+)G		Rec=1.0 WET	
		S-8	63	SW					
			60	SP					
			100/.3						
45						43.5' Boulder 45.0'			
						(GLACIAL ICE-CONTACT)			

GEOSCIENCE CORPORATION

HAM, NEW YORK (516) 783-8102

TEST BORING LOG

BORING NO.

MW-9

ST Kerry Chemical

GHR Engineering Associates, Inc.

SHEET 1 OF 3

ING CONTRACTOR

Deliz/Elice & Co., Inc.

JOB NO. 2006-3-4632

SE RI/FS

ELEVATION 1036.05

OWATER

CASING

SAMPLE

CORE

DATUM MSL

TIME

DEPTH

CASING

TYPE

SS

DATE STARTED 10/29/86

DIAMETER

3"

DATE FINISHED 10/29/86

WEIGHT

140#

DRILLER Wayne Ryman

FALL

30"

INSPECTOR Gordon M. Stevens

CASING
BLOWS

SAMPLE
NUMBER

BLOWS
ON
SAMPLE
SPOON
PER 6"

UNIFIED
CLASSI-
FICATION

GRAPHIC
LOG

IDENTIFICATION

REMARKS

26

SW

Br 0 cmfS, tCy\$, a cmfG; cbl fgmts;
rts

Rec=1.2
Damp

14

S-1

58

14

36

S-2

9

9

21

Cndrs; wd; brk

Rec=1.2
Damp

(FILL)

DO

(4.2)

Rec=1.2
Moist/WET

Br cmf G a(+), cmfS, t (+) \$&C

Brown coarse to fine GRAVEL and (+)
coarse to fine Sand, trace (+) Silt,
Clay.

5

S-3

5

6

7

SM

11

GW

10

S-4

23

20

Br cm(+)fG s(-), cm S, t(-)Cy\$, cbl
fgmt

Rec=2.0
WET

19

GW

25

S-5

31

Br cmfG S(+), cmf S, t Cy\$

Rec=2.0
WET

30

(FLUVIAL)

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK				TEST BORING LOG		BORING NO. MW-9		
PROJECT Kerry Chemical						SHEET 2 OF 3		
CLIENT GHR Engineering Associates, Inc.						JOB NO. 2006-3-4632		
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS	
15		S-6	9	SW		Br c(+)mfS, t\$, a mf(+)G (FLUVIAL) 10.6	Rec=1.7 WET	
			11					
			14	SP		Brgn fS, a(+)\$, vvd; \$ prts.	Sharp Contact	
			27					
		S-7	11	SP		DO; occ \$yC lns; mtld	Rec=1.4 WET	
			12				Mtld below Sil	
			16					
			22					
		S-8	8	SP		DO; dk br prts	Rec=1.6 WET	
			18					
			22					
			25					
	S-9	7	SP		Brown Cy\$ a (+), fS	Rec=2.0		
		8			Brown CLAYEY SILT and (+), fine Sand.	WET		
		13				No dk Br prts.		
		22						
20		S-10	8	SP		Br fS, S(+)\$, t(+)fG	Rec=1.7 WET	
			8			Brown fine SAND, some (+) Silt, trace		
			14		(-) fine Gravel.			
			20		18.8 Brgn fS, s\$; vvd			
		S-11	8	SP		BrGn fS, S\$; vvd; lyr mfS	Rec=2.0	
			10			Brown green fine SAND, some Silt;	WET	
			14			varved; layer medium to fine Sand.		
			23					

GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO. MW-9

Kerry Chemical

SHEET 3 OF 3

GHR Engineering Associates, Inc.

JOB NO. 2006-3-4632

DEPTH FEET	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
	S-12	8	SP		DO; occ lyr Cy\$	Rec=2.0 WET
		14				
		22				
		42				
25	S-13	11	SP		DO	Rec=2.0 WET
		11				
		20				
		27				
30	S-14		SP		DO	Rec=1.5 WET
					(GLACIO-LACUSTRINE) 28.0'	
					Bottom of Boring	

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK (518) 783-8102					TEST BORING LOG			BORING NO.	
PROJECT Kerry Chemical								MW-10D	
CLIENT GHR								SHEET 1 OF 9	
DRILLING CONTRACTOR Deliz/Elice & Company, Inc.								JOB NO. 2006-3-4632	
PURPOSE RI/FS								ELEVATION 1032.08	
GROUNDWATER					CASING	SAMPLE	CORE	DATUM MSL	
DATE	TIME	DEPTH	CASING	TYPE		SS		DATE STARTED 10/14/86	
				DIAMETER		2"		DATE FINISHED 10/28/86	
				WEIGHT		140#		DRILLER Wayne Ryman	
				FALL		30"		INSPECTOR Gordon M. Stevens	

DEPTH FT.	CASING BLOWS	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
5		S-1	5	SM		Dk br 0 cmf S, 1 Cy\$, 1 c(-)mf G; cndrs; brk; charceal	REC=1.5' Fill Moist
			7				
			11				
			8				
		S-2	11	SW		Br cmf(+) S, t \$, s cmf G; cndrs; brk	REC=1.5' Fill Moist
			8				
			11				
			14				
		S-3	12	SW		DO 4.9-5.5 cndry tan tar	REC=1.7' HNU=2.0 Bad smell Moist
			9				
			12				
			12				
		S-4	4			6-6.4 tan tar 6.4-Dk br f S s, Cy\$; Dec wood (Fill)	REC=1.5' V. Moist
			2				
			2				
			7				
	S-5	12	GW	Do; Top .4 tar; mtdl 9.0' 9.0 Dk br cmf G l, cmf S, t Cy\$; mtdl	REC=1.9' WET		
		8					
		22					
		28					
10						[FLUVIAL[	

UNN GEOSCIENCE CORPORATION
LATHAM, NEW YORK

TEST BORING LOG

BORING NO.

MW-10D

PROJECT Kerry Chemical

SHEET 2 OF 9

CLIENT GHR

JOB NO. 2006-3-4632

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
15		S-6	15	GW		DO; cndrs	REC=1.1' WET
			50			<u>Dark brown coarse to fine GRAVEL</u>	
			37			<u>little, coarse to fine Sand, trace</u>	
			21			<u>Clayey Silt; mottled; cinders</u>	
		S-7	13	GW		DO; cbl frag 13.6-14.0	REC=2.0 WET
			18				
			22				
			25				
		S-8	7	GW		DO; cndrs	REC=2.0' WET
			13				
20			16	SP		[FLUVIAL] 15.2'	REC=2.0' WET Sampled only mf S
			15			Br gr mf S, t \$	
		S-9	7	SP		Br gr m(-)f S, t \$; occ prt \$	REC=1.8' WET
			13			<u>Brown gray medium(-) to fine SAND,</u>	
			16			<u>trace Silt; occasional Silt partings</u>	
			22				
		S-10	9	SP		Br gr m(-)f S, t \$; tmf G at base	REC=2.0 WET
			13				
			20	SP		19.4 - Br m(-)f S, t \$ (sharp break in color)	
			22				
		S-11	5	SP		Br gr m(-)f \$, t \$, tmf G at base	REC=2.0 WET
			16	SP		21.4 - Br f(+) S, t \$	
			32				
			43				
						(GLACIO-LACUSTRINE)	

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK					TEST BORING LOG		BORING NO. MW-10D		
PROJECT Kerry Chemical							SHEET 3 OF 9		
CLIENT GHR							JOB NO. 2006-3-4632		
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		REMARKS	
25		S-12	11	SP		Br f S, t \$		REC=0.6' WET	
			15			Brown fine SAND, trace Silt			
			21						
			21						
		S-13	12	GW		DO		REC=1.4' WET	
			14			(GLACIO-LACUSTRINE) 24.7'			
		S-14	30			24.7' Br cmf G s(+), cmf S, t Cy\$			
			32			Brown coarse to fine GRAVEL some(+), coarse to fine Sand, trace Clayey Silt			
		S-15	5	ML		DO		REC=1.4' WET	
			14			26.9 - Br Cy\$; cbl fgmt			
			32						
			100/.2						
30		S-16	28	SW		Br cmf G a(-), cmf S, t Cy\$		REC=1.5' WET	
			45	SP		28.9 - Br f S, 3Cy\$			
			50						
			52	GW					
		S-17	12			Br cmf(+) G s, c(+)mf S, t Cy\$		REC=1.3' WET (ice contact)	
			26			30.7			
			75			Br f S, t f G, t Cy\$; occ seam c Sa, f G			
			100/.3	NO RECOVERY					
		S-18	6			REC=0			
			100/ 3	[GLACIO-LACUSTRINE] 32.8'					
	34						boulder		
							[TILL SEQUENCE]		

BORING NO. MW-10D

SHEET 4 OF 9

JOB NO. 2006-3-4632

BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON, PER G	UNIFIED CLASSIFICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
					Boulder	occ "soft" zones in boulder
	S-19	100/.4	SM		Rd br cmf S, 1 Cy\$, a(-)cmf(+) G 38.0	REC=0.3'
					Boulder 38.4	Till like Moist
					41.0'	
	S-20	98	SM		Rd br cmf S, 1(+) Cy\$, a(-) cmf(+) G	REC=0.3'
		100/.1			Red brown coarse to fine Sand, little (+) Clayey Silt, and(-) coarse to fine Gravel	Till Moist
					43.5'	
					Boulder	
					[TILL SEQUENCE] 46.0'	

DUNN GEOSCIENCE CORPORATION LATHAM, NEW YORK				TEST BORING LOG		BORING NO. MW-10D	
PROJECT Kerry Chemical						SHEET 5 OF 9	
CLIENT GHR						JOB NO. 2006-3-4632	
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARK
50		S-21	100/.2	SM		DO	REC=0.2' Moist Till
		S-22	100/.4			NO RECOVERY	REC= No Rec.
		S-23	100/.2	SM		DO; cbl fgmt	REC=0.2 Moist change to standard sampling
55							
		S-24	100/.1			NO RECOVERY 55.1	REC=No Rec
						Boulder	
						56.5'	
				30	SM- SP	Br mf S, 1(-) Cy\$; cbl fgmt at base	REC=1.1' WET
		S-25	70			Brown medium to fine SAND, little(-) Clayey Silt; cobble fragment at base	Cobbly Zone
			100/.3				
						[GLACIAL ICE-CONTACT]	

[illegible]

[illegible]

BORING NO. MW-10D

SHEET 8 OF 9

JOB NO. 2006-3-4632

[illegible]

[illegible]

GEOSCIENCE CORPORATION

MAN, NEW YORK (318) 783-8102

TEST BORING LOG

BORING NO.

Kerry Chemical

MW-11

GHR

SHEET 1 OF 2

CONTRACTOR Deliz/Elice & Company, Inc.

JOB NO. 2006-3-4632

RI/FS

ELEVATION 1032.65

WATER

CASING

SAMPLE

CORE

DATUM MSL

TIME

DEPTH

CASING

TYPE

SS

DATE STARTED 11/17/86

DIAMETER

3"

DATE FINISHED 11/17/86

WEIGHT

140#

DRILLER Paul LeClair

FALL

30"

INSPECTOR Walter O. Howard

CASING
BLOWS

SAMPLE
NUMBER

BLOWS
ON
SAMPLE
SPOON
PER 6"

UNIFIED
CLASSI-
FICATION

GRAPHIC
LOG

IDENTIFICATION

REMARKS

Brbl cmf G a, mf(+) S, s \$ & C;
.8 cndr lyr

REC=1.9
Damp

Water in augers
@ 3.5'

Br cmf S, a cmf G; cbl. fgmt
Brown coarse to fine SAND, and coarse
to fine Gravel; cobble fragment

REC=1.4
WET

(FILL)

8.5'

inferred

(GLACIO-LACUSTRINE)

5

10

[illegible]

MONITORING WELL COMPLETION LOG

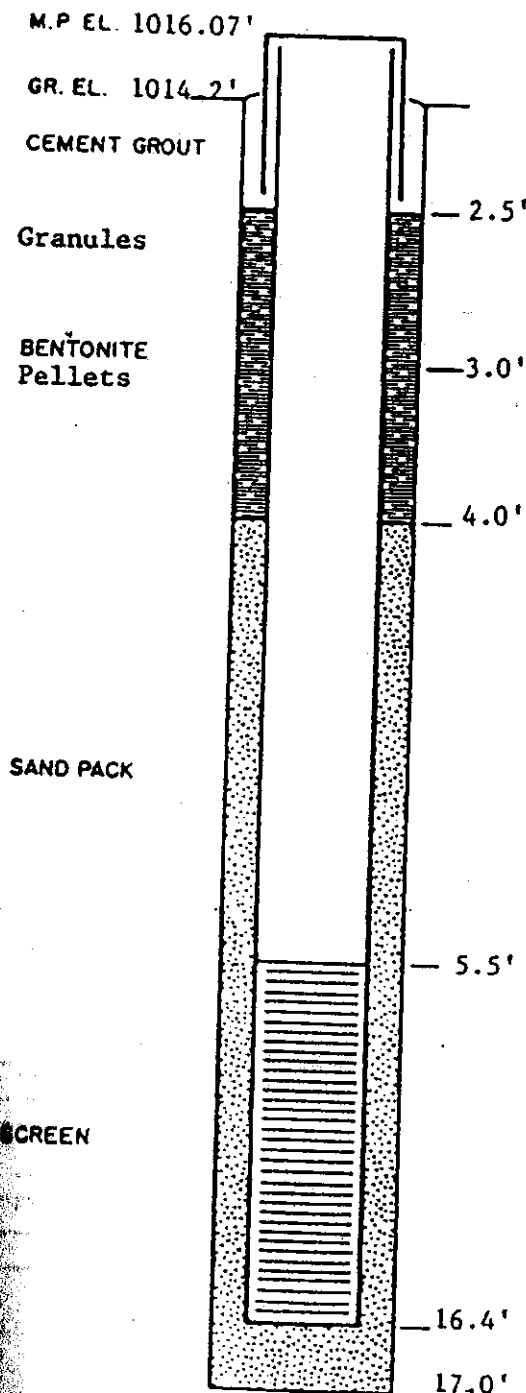
WELL NO. MW-3S



DUNN GEOSCIENCE CORPORATION
 5 Northway Lane, North
 Latham, New York 12110
 (518) 783-8102

Project Kerry Chemical
 Client GHR
 Project No. 2006-3-4632
 Date Drilled 11/5/86
 Date Developed 11/22/86

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector John S. Munsey
 Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring
 Static Water Level 1010.83' Date 11/24/86
 Measuring Point Top of riser
 Total Depth of Well 16.4' below grade
 Total Depth of Boring 17.0' below grade

Drilling Method
 Type HSA Diameter 4 1/2" ID
 Casing _____

Sampling Method
 Type SPLIT Spoon Diameter 3"
 Weight 140# Fall 30"
 Interval Standard

Riser Pipe Left in Place
 Material SS Diameter 2"
 Length 7.5' Joint Type Flush

Screen
 Material SS Diameter 2"
 Slot Size 10 Interval 5.5' - 16.4'
 Stratigraphic Unit Screened Fluvial/Glacio-lacustrine/Till

Filter Pack
 Sand 4QROK Gravel _____ Natural _____
 Amount _____ Interval 4.0' - 17.0'

Seal(s)
 Type Bent. Pellets Interval 3.0' - 4.0'
 Type Bent. Granules Interval 2.5' - 3.0'
 Type _____ Interval _____
 Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. MW-3I



DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

Client GHR

Project No. 2006-3-4632

Date Drilled 11/12 - 13/86

Date Developed 11/21 - 22/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1015.88'

GR. EL. 1013.6'

CEMENT/
BENTONITE
GROUT

BENTONITE
Slurry

SAND PACK

SCREEN

Bentonite
Pellets

NOT TO SCALE

Inspector Walter O. Howard

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1015.38' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 75.0' below grade

Total Depth of Boring 85.5' below grade

Drilling Method

Type Water Rotary Diameter 4" OD

Casing

Sampling Method

Type Split Spoon Diameter 3"

Weight 140# Fall 30"

Interval Standard

Riser Pipe Left in Place

Material SS Diameter 20"

Length 66.48' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 10 Interval 64.2' - 75.0'

Stratigraphic Unit Screened Glacio-lacustrine

Filter Pack

Sand 4 QROK Gravel Natural

Amount Interval 61.3' - 76.5'

Seal(s)

Type Bent. Slurry Interval 44.8' - 61.3'

Type Bent. Pellets Interval 76.5' - 85.5'

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

Bedrock @ 78.0'

MONITORING WELL COMPLETION LOG

WELL NO. MW-4S

DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

Client GHR

Project No. 2006-3-4632

Date Drilled 11/4/86

Date Developed 11/21/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1019.01'

GR. EL. 1016.9'

CEMENT GROUT

2.0'

BENTONITE
Pellets &
Granules

4.0'

SAND PACK

5.3'

SCREEN

16.1'

17.5'

NOT TO SCALE

Inspector John S. Munsey

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1013.92' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 16.1' below grade

Total Depth of Boring 17.5' below grade

Drilling Method

Type HSA Diameter 4 1/2" ID

Casing

Sampling Method

Type No Sampling Diameter

Weight Fall

Interval

Riser Pipe Left in Place

Material SS Diameter 2"

Length 7.46' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 10 Interval 5.3' - 16.1'

Stratigraphic Unit Screened Fluvial/Glacio-Lacustrine

Filter Pack

Sand 4 QROK Gravel Natural

Amount Interval 4.0' - 17.5'

Seal(s)

Type Bent. Granules Interval 2.0' - 4.0'

Type & pellets Interval

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. MW-4I



DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

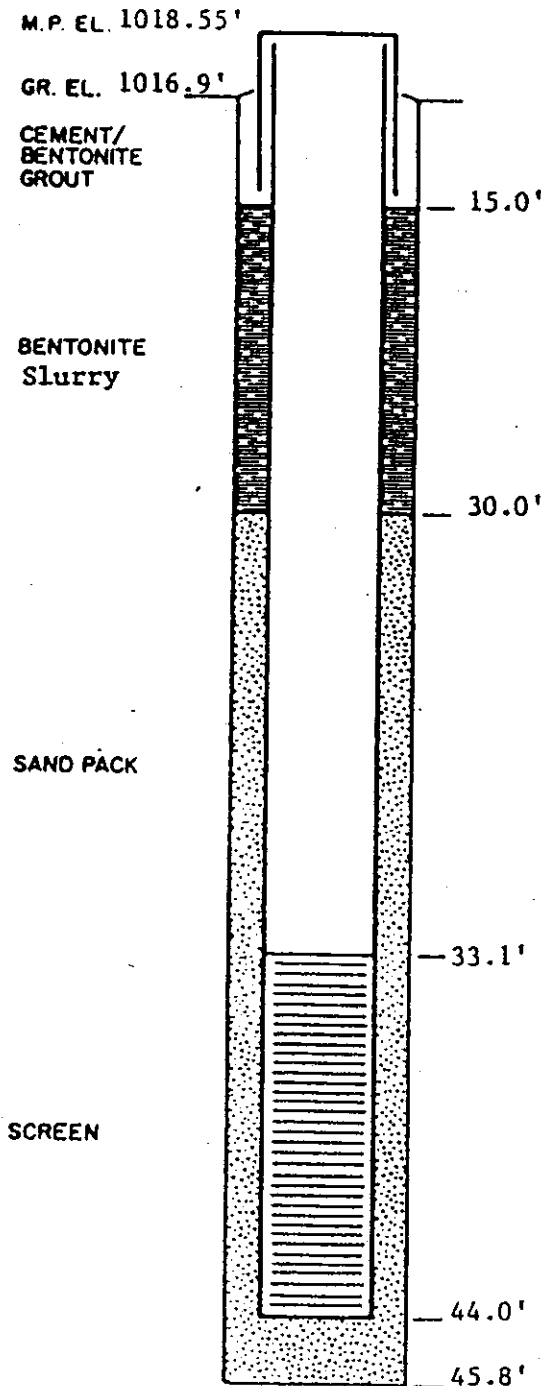
Client GHR

Project No. 2006-3-4632

Date Drilled 11/10/86

Date Developed 11/21/86

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Walter O. Howard

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1015.57' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 44.0' below grade

Total Depth of Boring 45.8' below grade

Drilling Method

Type Water Rotary Diameter 4" OD
Casing

Sampling Method

Type Split Spoon Diameter 3"
Weight 140# Fall 30"
Interval Standard

Riser Pipe Left in Place

Material SS Diameter 2"
Length 34.8' Joint Type Flush

Screen

Material SS Diameter 2"
Slot Size 20 Interval 33.1' - 44.0'
Stratigraphic Unit Screened Till

Filter Pack

Sand 4 QROK Gravel Natural
Amount Interval 30.0' - 45.8'

Seal(s)

Type Bent. Slurry Interval 15.0' - 30.0'
Type Interval
Type Interval

Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. MW-35

DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

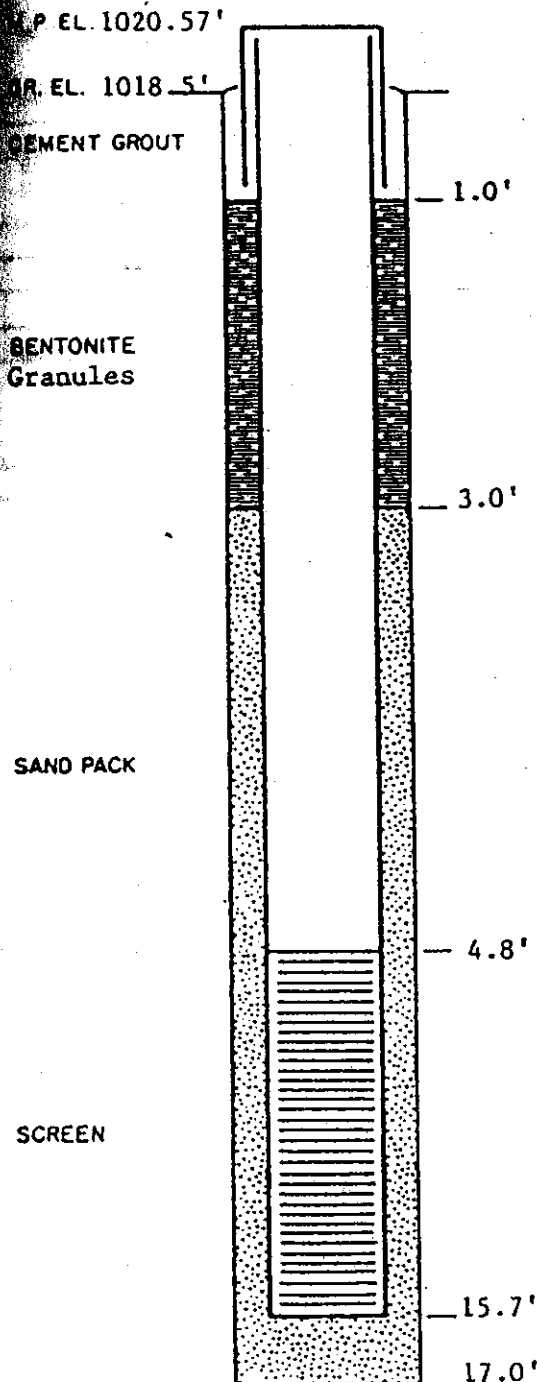
Client GHR

Project No. 2006-3-4632

Date Drilled 11/10/86

Date Developed 11/22/86

WELL CONSTRUCTION DETAIL



Inspector Gordon M. Stevens

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1017.12' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 15.7' below grade

Total Depth of Boring 17.0' below grade

Drilling Method

Type Water Rotary Diameter 4" OD

Casing

Sampling Method

Type No Sampling Diameter

Weight Fall

Interval

Riser Pipe Left in Place

Material SS Diameter 2"

Length 6.65' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 10 Interval 4.8' - 15.7'

Stratigraphic Unit Screened Fill/Fluvial/
glacio-lacustrine

Filter Pack

Sand 4 QROK Gravel Natural

Amount Interval 3.0' - 17.0'

Seal(s)

Type Bent. Granules Interval 1.0' - 3.0'

Type Interval

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

Boulders 5' - 9' & 11' - 16'

NOT TO SCALE

MONITORING WELL COMPLETION LOG

WELL NO. MW-51



DUNN GEOSCIENCE CORPORATION
 5 Northway Lane, North
 Latham, New York 12110
 (518) 783-8102

Project Kerry Chemical
 Client GHR
 Project No. 2006-3-4632
 Date Drilled 11/10/86
 Date Developed 11/21/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1021.28'

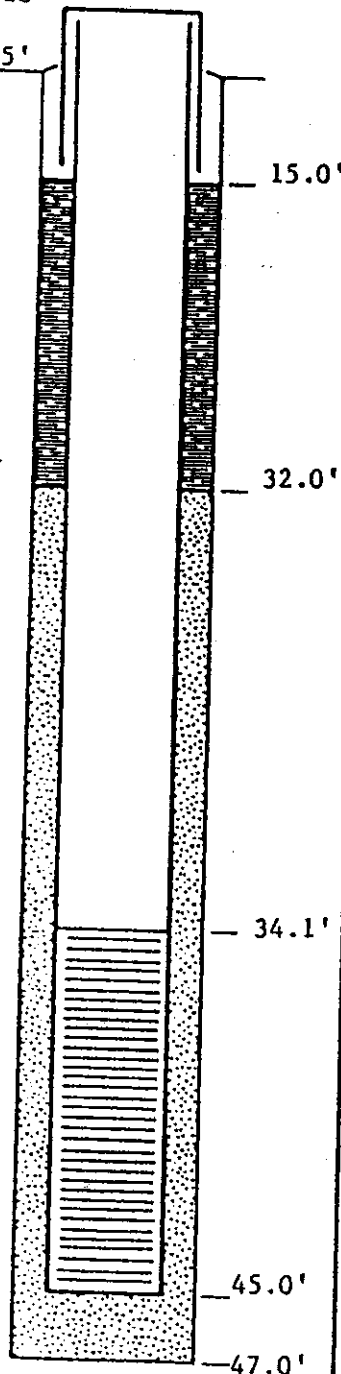
GR. EL. 1018.5'

CEMENT/
BENTONITE
GROUT

BENTONITE
Slurry

SAND PACK

SCREEN



NOT TO SCALE

Inspector Gordon M. Stevens
 Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring
 Static Water Level 1018.62' Date 11/24/86
 Measuring Point Top of riser
 Total Depth of Well 45.0' below grade
 Total Depth of Boring 47.0' below grade

Drilling Method
 Type Water Rotary Diameter 4" OD
 Casing _____

Sampling Method
 Type No Sampling Diameter _____
 Weight _____ Fall _____
 Interval _____

Riser Pipe Left in Place
 Material SS Diameter 2"
 Length 36.29' Joint Type Flush

Screen
 Material SS Diameter 2"
 Slot Size 10 Interval 34.1' - 45.0'
 Stratigraphic Unit Screened Till

Filter Pack
 Sand 4 QROK Gravel _____ Natural _____
 Amount _____ Interval 32.0' - 47.0'

Seal(s)
 Type Bent. Slurry Interval 15.0' - 32.0'
 Type _____ Interval _____
 Type _____ Interval _____

Locking Casing Yes ☒ No ☐

Notes: 6" PVC outer casing set in upper 10' of boring

MONITORING WELL COMPLETION LOG

WELL NO. MW-5D

DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

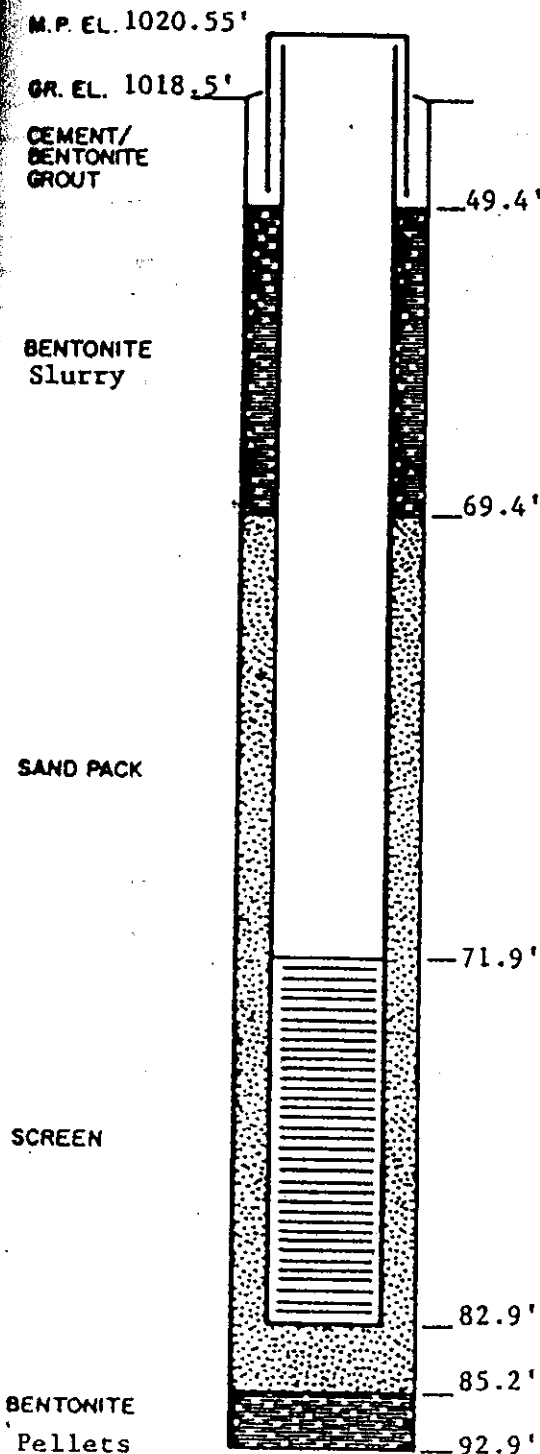
Client GHR

Project No. 2006-3-4632

Date Drilled 10/23/86 - 11/3/86

Date Developed 11/21/86

WELL CONSTRUCTION DETAIL



Inspector John S. Munsey

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1017.17' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 82.9' below grade

Total Depth of Boring 92.9' below grade

Drilling Method

Type Water Rotary Diameter 4" OD

Casing

Sampling Method

Type Split Spoon Diameter 3"

Weight 140# Fall 30"

Interval Continuous

Riser Pipe Left in Place

Material SS Diameter 2"

Length 73.71' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 20 Interval 71.9' - 82.9'

Stratigraphic Unit Screened Glacio-lacustrine/
Glacial Ice-Contact

Filter Pack

Sand 4 QROK Gravel Natural

Amount Interval 69.4' - 85.2'

Seal(s)

Type Bent. Pellets Interval 85.2' - 92.9'

Type Bent. Slurry Interval 49.4' - 69.4'

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

6" outer casing set in upper 10' of
boring

MONITORING WELL COMPLETION LOG

WELL NO. MW-6S



DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

Client GHR

Project No. 2006-3-4632

Date Drilled 10/29 - 30/86

Date Developed 11/22/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1037.54'

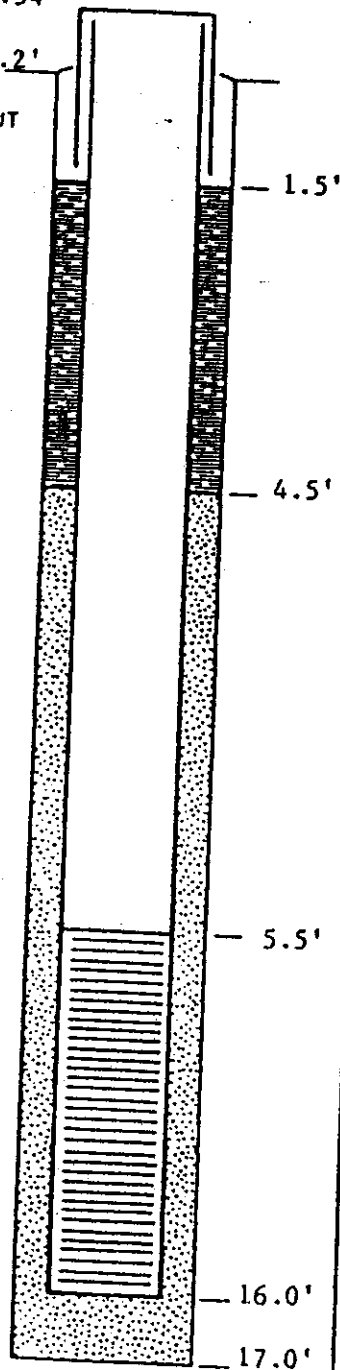
GR. EL. 1035.2'

CEMENT GROUT

BENTONITE
Pellets &
Granules

SAND PACK

SCREEN



NOT TO SCALE

Inspector Gordon M. Stevens

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1033.17' Date 11/14/86

Measuring Point Top of riser

Total Depth of Well 16.0' below grade

Total Depth of Boring 17.0' below grade

Drilling Method

Type HSA Diameter 4 1/4" ID

Casing

Sampling Method

Type No Sampling Diameter

Weight

Interval

Riser Pipe Left in Place

Material SS Diameter 2"

Length 7.78' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 20 Interval 5.5' - 16.0'

Stratigraphic Unit Screened Glacial Ice-Contact/
Till

Filter Pack

Sand 4 OROK Gravel

Natural

Amount Interval 4.5' - 17.0'

Seal(s)

Type Bent. Pellets Interval 1.5' - 4.5'

Type and Granules Interval

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. MW-6I

DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

Client GHR

Project No. 2006-3-4632

Date Drilled 10/30 - 31/86

Date Developed 11/20/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1037.34'

GR. EL. 1035.2'

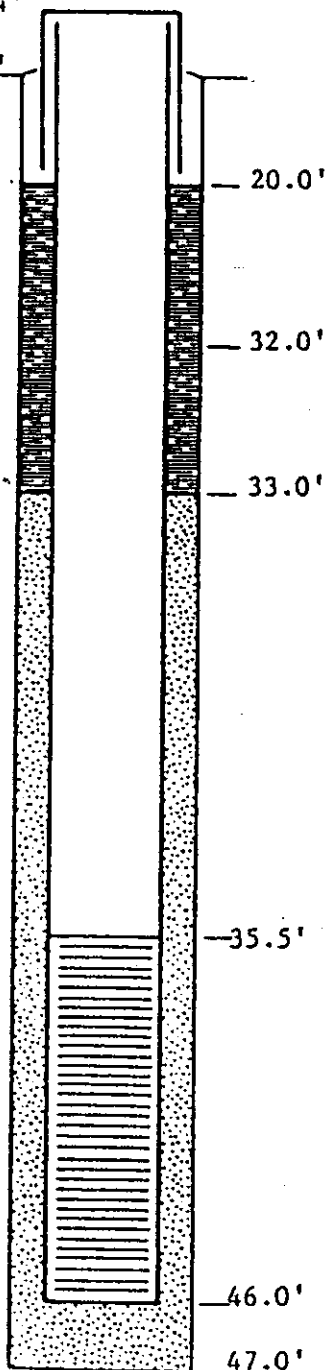
CEMENT/
BENTONITE
GROUT

Bentonite
Slurry

Bentonite
Pellets

SAND PACK

SCREEN



NOT TO SCALE

Inspector Gordon M. Stevens

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1027.27' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 46.0' below grade

Total Depth of Boring 47.0' below grade

Drilling Method

Type HSA Diameter 4 1/2" ID

Casing

Sampling Method

Type No Sampling Diameter

Weight Fall

Interval

Riser Pipe Left in Place

Material SS Diameter 2"

Length 37.73' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 20 Interval 35.5' - 46.0'

Stratigraphic Unit Screened Till/Glacial Ice-Contact

Filter Pack

Sand 4 OROK Gravel Natural

Amount Interval 33.0' - 47.0'

Seal(s)

Type Bent. Pellets Interval 32.0' - 33.0'

Type Bent. Slurry Interval 20.0' - 32.0'

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. MW-6D



DUNN GEOSCIENCE CORPORATION
 5 Northway Lane, North
 Latham, New York 12110
 (518) 783-8102

Project Kerry Chemical
 Client GHR
 Project No. 2006-3-4632
 Date Drilled 10/15 - 21/86
 Date Developed 11/20/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1037.86'

GR. EL. 1035.2'

Cement/Bentonite Grout

Formational Collapse

Bentonite Pellets

66.0'

76.0'

79'

82.0'

Screen

Formational Collapse

93.0'

100.0'

NOT TO SCALE

Inspector Gordon M. Stevens
 Drilling Contractor Deliz/Elice Co. Inc.

Type of Well Monitoring
 Static Water Level 1018.03' Date 11/24/86
 Measuring Point Top of riser
 Total Depth of Well 93.0' below grade
 Total Depth of Boring 100.0' below grade

Drilling Method
 Type HSA/Rotary Diameter 4 1/4" ID/4" OD
 Casing

Sampling Method
 Type SPLIT Spoon Diameter 3"
 Weight 140 # Fall 30"
 Interval Continuous/Standard

Riser Pipe Left in Place
 Material SS Diameter 2"
 Length 84.69' Joint Type Flush

Screen
 Material SS Diameter 2"
 Slot Size 20 Interval 82.0' - 93.0'
 Stratigraphic Unit Screened Till/Glacial Ice-Contact

Filter Pack
 Sand 4 QROK Gravel Natural
 Amount Interval 79.0 - 82.0'

Seal(s)
 Type Bent. Pellets Interval 76.0 - 79.0'
 Type Interval
 Type Interval

Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

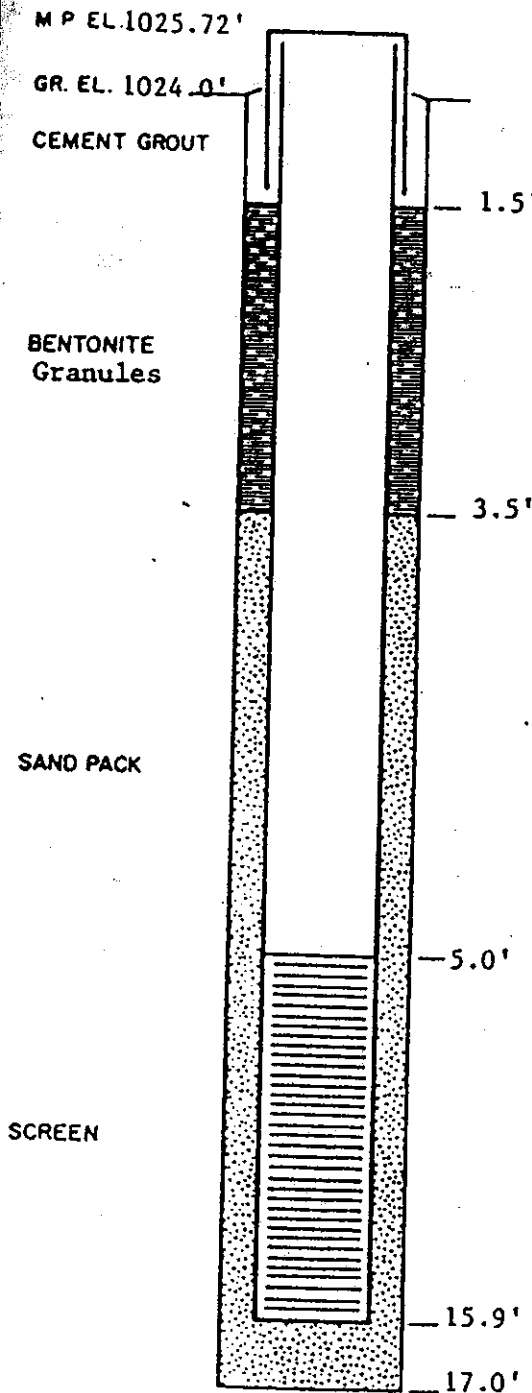
WELL NO. MW-7S



DUNN GEOSCIENCE CORPORATION
 5 Northway Lane, North
 Latham, New York 12110
 (518) 783-8102

Project Kerry Chemical
 Client GHR
 Project No. 2006-3-4632
 Date Drilled 11/4 - 5/86
 Date Developed 11/22/86

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Gordon M. Stevens
 Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring
 Static Water Level 1019.99' Date 11/24/86
 Measuring Point Top of riser
 Total Depth of Well 15.9' below grade
 Total Depth of Boring 17.0' below grade

Drilling Method
 Type HSA Diameter 4 1/2" ID
 Casing _____

Sampling Method
 Type No Sampling Diameter _____
 Weight _____ Fall _____
 Interval _____

Riser Pipe Left in Place
 Material SS Diameter 2"
 Length 6.85' Joint Type Flush

Screen
 Material SS Diameter 2"
 Slot Size 10 Interval 5.0' - 15.9'
 Stratigraphic Unit Screened Fill/Fluvial

Filter Pack
 Sand 4 QROK Gravel _____ Natural _____
 Amount _____ Interval 3.5' - 17.0'

Seal(s)
 Type Bent. Granules Interval 1.5' - 3.5'
 Type _____ Interval _____
 Type _____ Interval _____

Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

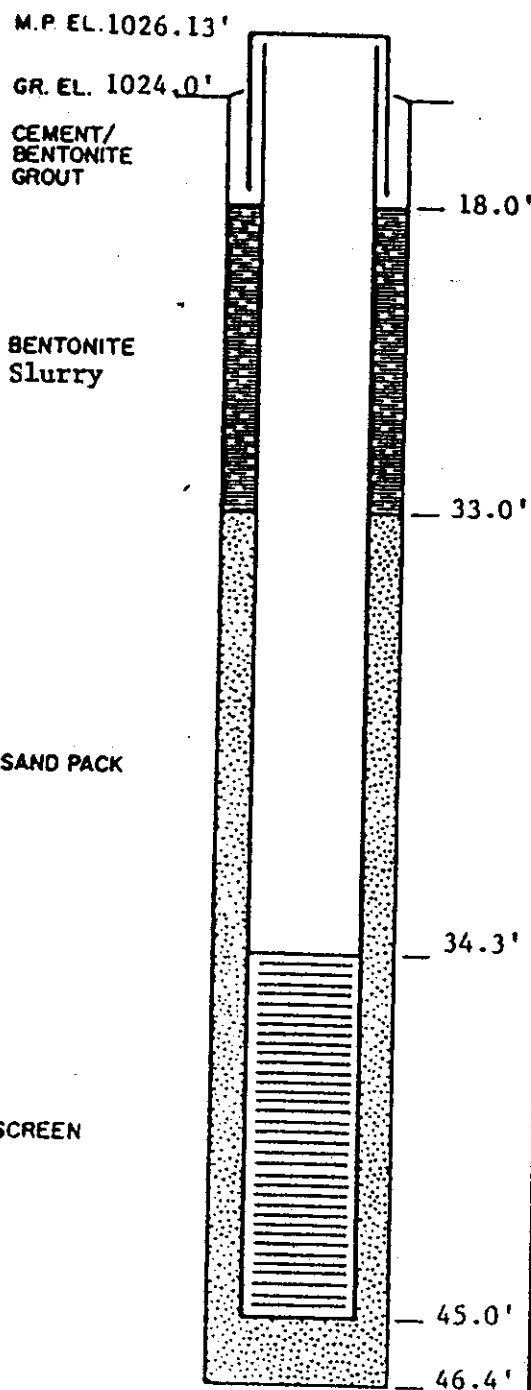
WELL NO. MW-71



DUNN GEOSCIENCE CORPORATION
 5 Northway Lane, North
 Latham, New York 12110
 (518) 783-8102

Project Kerry Chemical
 Client GHR
 Project No. 2006-3-4632
 Date Drilled 11/4/86
 Date Developed 11/21/86

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Gordon M. Stevens
 Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring
 Static Water Level 1021.47' Date 11/24/86
 Measuring Point Top of riser
 Total Depth of Well 45.0' below grade
 Total Depth of Boring 46.4' below grade

Drilling Method
 Type Water Rotary Diameter 4" OD
 Casing _____

Sampling Method
 Type Split Spoon Diameter 3"
 Weight 140# Fall 30"
 Interval Standard

Riser Pipe Left in Place
 Material SS Diameter 2"
 Length 36.35' Joint Type Flush

Screen
 Material SS Diameter 2"
 Slot Size 10 Interval 34.3' - 45.0'
 Stratigraphic Unit Screened Till

Filter Pack
 Sand 4 QROK Gravel _____ Natural _____
 Amount _____ Interval 33.0' - 46.4'

Seal(s)
 Type Bent. Slurry Interval 18.0' - 33.0'
 Type _____ Interval _____
 Type _____ Interval _____

Locking Casing Yes ☒ No ☐

Notes:
 6" PVC out casing set in upper 10' of boring

MONITORING WELL COMPLETION LOG

WELL NO. MW-8S

DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

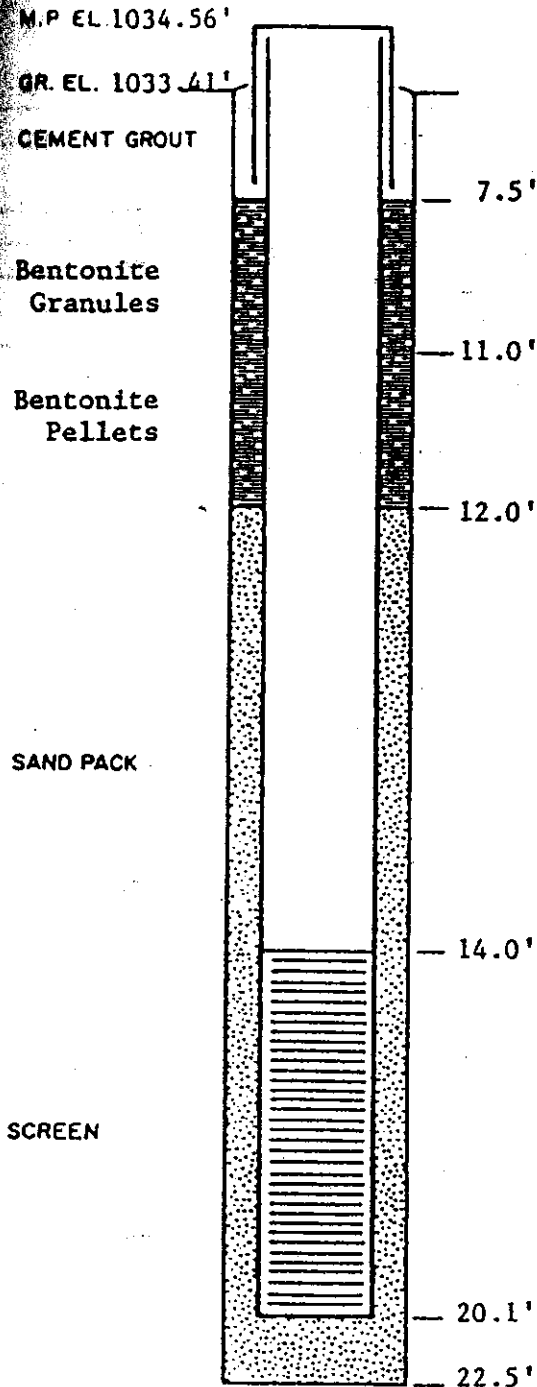
Client GHR

Project No. 2006-3-4632

Date Drilled 11/6/86

Date Developed 11/21 - 22/86

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Gordon M. Stevens

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1027.87' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 20.1' below grade

Total Depth of Boring 22.5' below grade

Drilling Method

Type HSA Diameter 4 1/4" ID

Casing

Sampling Method

Type Split Spoon Diameter 3"

Weight 140# Fall 30"

Interval Standard

Riser Pipe Left in Place

Material SS Diameter 2"

Length 16.0' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 20 Interval 14.0' - 20.1'

Stratigraphic Unit Screened Glacial Ice-Contact

Filter Pack

Sand 40RQK Gravel Natural

Amount Interval 12.0' - 22.5'

Seal(s)

Type Bent. Pellets Interval 11.0' - 12.0'

Type Bent. Granules Interval 7.5' - 11.0'

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

East of Hwy.

MONITORING WELL COMPLETION LOG

WELL NO. MW-81



DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

Client GHR

Project No. 2006-3-4632

Date Drilled 11/6 - 7/86

Date Developed 11/21/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1034.35'

GR. EL. 1033.41'

CEMENT/
BENTONITE
GROUT

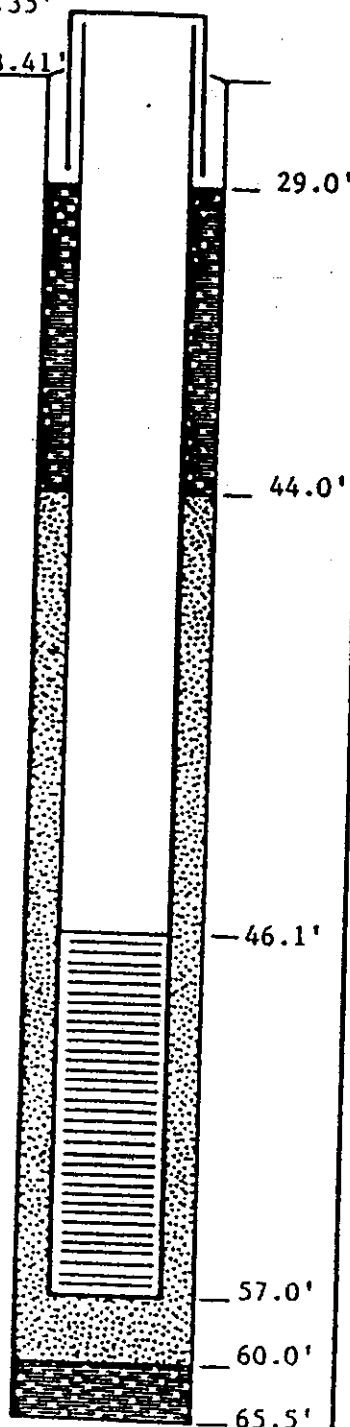
BENTONITE
Slurry

SAND PACK

SCREEN

Bentonite
Pellets

NOT TO SCALE



Inspector Gordon M. Stevens

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1026.42' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 57.0' below grade

Total Depth of Boring 65.5' below grade

Drilling Method

Type Water Rotary Diameter 4" OD

Casing

Sampling Method

Type Split Spoon Diameter 2"

Weight 140# Fall 30"

Interval Standard

Riser Pipe Left in Place

Material SS Diameter 2"

Length 48.01' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 10 Interval 46.1' - 57.0'

Stratigraphic Unit Screened Glacial Ice-Contact/
Till/Glacio-lacustrine

Filter Pack

Sand 4 OROK Gravel Natural

Amount Interval 44.0' - 60.0'

Seal(s)

Type Bent. Pellets Interval 60.0' - 65.5'

Type Bent. Slurry Interval 29.0' - 44.0'

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

East of Hwy.

Bedrock @ 60.5'.

Flowing artesian in bedrock prior to
sealing.

MONITORING WELL COMPLETION LOG

WELL NO. MW-9



DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

Client GHR

Project No. 2006-3-4632

Date Drilled 10/29/86

Date Developed 11/22/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1038.33'

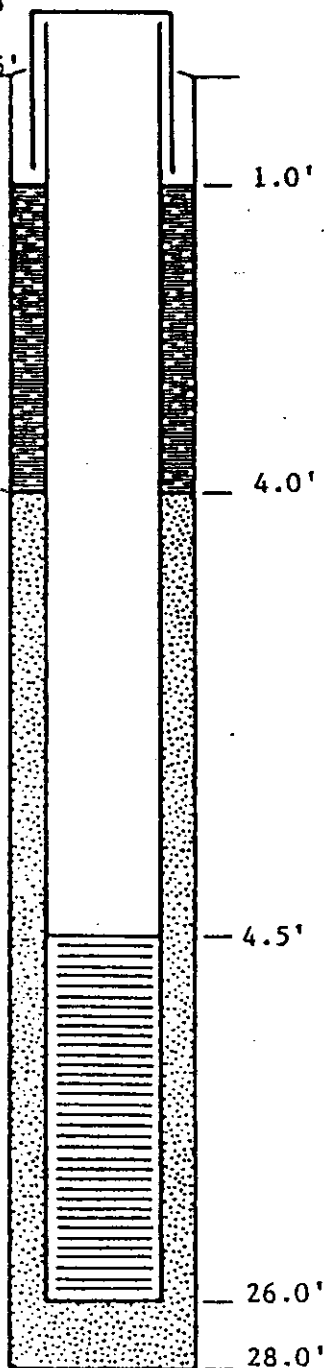
GR. EL. 1036.05'

CEMENT GROUT

BENTONITE
Granules

SAND PACK

SCREEN



NOT TO SCALE

Inspector Gordon M. Stevens

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1032.97' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 26.0' below grade

Total Depth of Boring 28.0' below grade

Drilling Method

Type HSA Diameter 4 1/2" ID

Casing

Sampling Method

Type split spoon Diameter 3"

Weight 140# Fall 30"

Interval Continuous

Riser Pipe Left in Place

Material SS Diameter 2"

Length 6.71' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 10 Interval 4.5' - 26.0'

Stratigraphic Unit Screened Lacustrine/Fluvial

Filter Pack

Sand 4 QROK Gravel Natural

Amount Interval 4.0' - 28.0'

Seal(s)

Type Bent. Granules Interval 1.0' - 4.0'

Type Interval

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

21.5' (20') Screen

MONITORING WELL COMPLETION LOG

WELL NO. MW-10S



DUNN GEOSCIENCE CORPORATION
 5 Northway Lane, North
 Latham, New York 12110
 (518) 783-8102

Project Kerry Chemical
 Client GHR
 Project No. 2006-3-4632
 Date Drilled 10/14 - 15/86
 Date Developed _____

WELL CONSTRUCTION DETAIL

M.P. EL1033.81'

GR. EL. 1032.08'

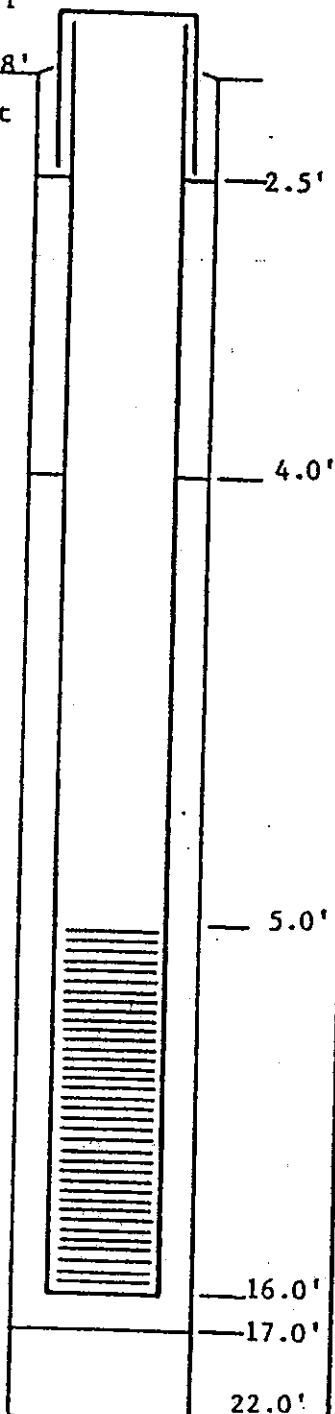
Cement Grout

Bentonite
Granules

Sand Pack

Screen

Formational
Collapse



NOT TO SCALE

Inspector Gordon M. Stevens
 Drilling Contractor Deliz/Elice Co. Inc.

Type of Well Monitoring
 Static Water Level 1026.62' Date 11/24/86
 Measuring Point Top of riser
 Total Depth of Well 16.0' below grade
 Total Depth of Boring 22.0' below grade

Drilling Method

Type HSA Diameter 4 1/2" ID
 Casing _____

Sampling Method

Type split spoon Diameter 3"
 Weight 140# Fall 30"
 Interval Continuous

Riser Pipe Left in Place

Material SS Diameter 2"
 Length 6.7' Joint Type Flush

Screen

Material SS Diameter 2"
 Slot Size 20 Interval 5.0' - 16.0'
 Stratigraphic Unit Screened Fluvial/Fill/lacustrine

Filter Pack

Sand 4 QROK Gravel _____ Natural _____
 Amount _____ Interval 4.0 - 17.0'

Seal(s)

Type Bent. Granules Interval 2.5 - 4.0'
 Type _____ Interval _____
 Type _____ Interval _____

Locking Casing Yes ☒ No ☐

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. MW-101

DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

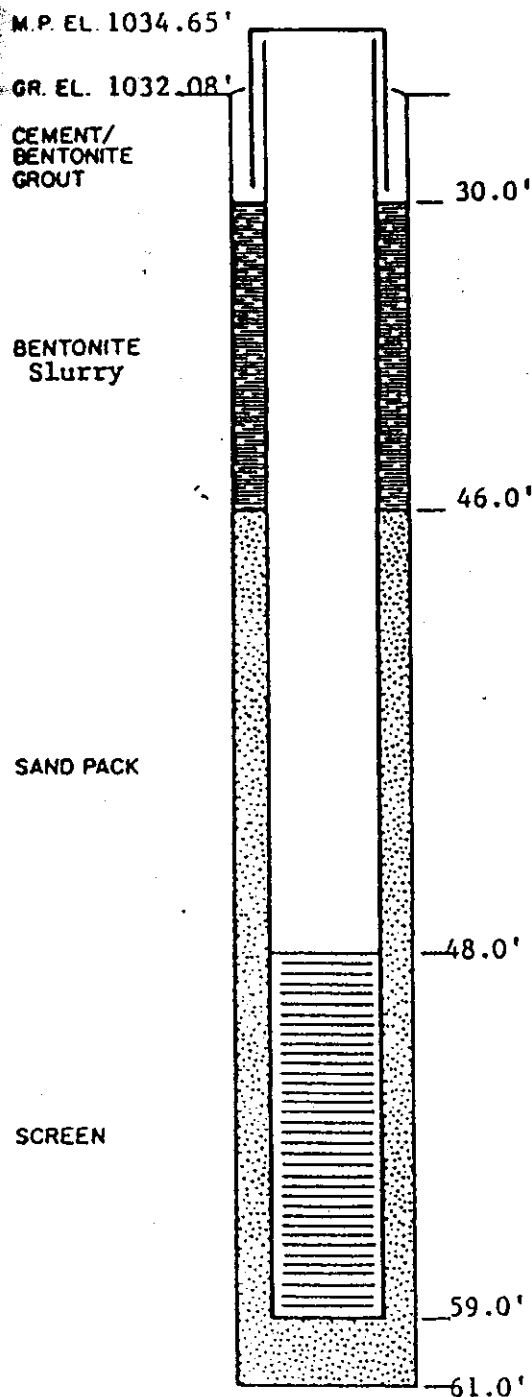
Client GHR

Project No. 2006-3-4632

Date Drilled 11/3/86

Date Developed 11/20/86

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Gordon M. Stevens
Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring
Static Water Level 1028.13' Date 11/24/86
Measuring Point Top of riser
Total Depth of Well 59.0' below grade
Total Depth of Boring 61.0' below grade

Drilling Method
Type Water Rotary Diameter 4" OD
Casing

Sampling Method
Type No Sampling Diameter
Weight Fall
Interval

Riser Pipe Left in Place
Material SS Diameter 2"
Length 50.45' Joint Type Flush

Screen
Material SS Diameter 2"
Slot Size 10 Interval 48.0' - 59.0'
Stratigraphic Unit Screened Till/Glacial
Ice-Contact

Filter Pack
Sand 4 QROK Gravel Natural
Amount Interval 46.0' - 61.0'

Seal(s)
Type Bent. Slurry Interval 30.0' - 46.0'
Type Interval
Type Interval

Locking Casing Yes ☒ No ☐

Notes:
6" PVC Outer Casing set in upper 10'
of boring

MONITORING WELL COMPLETION LOG

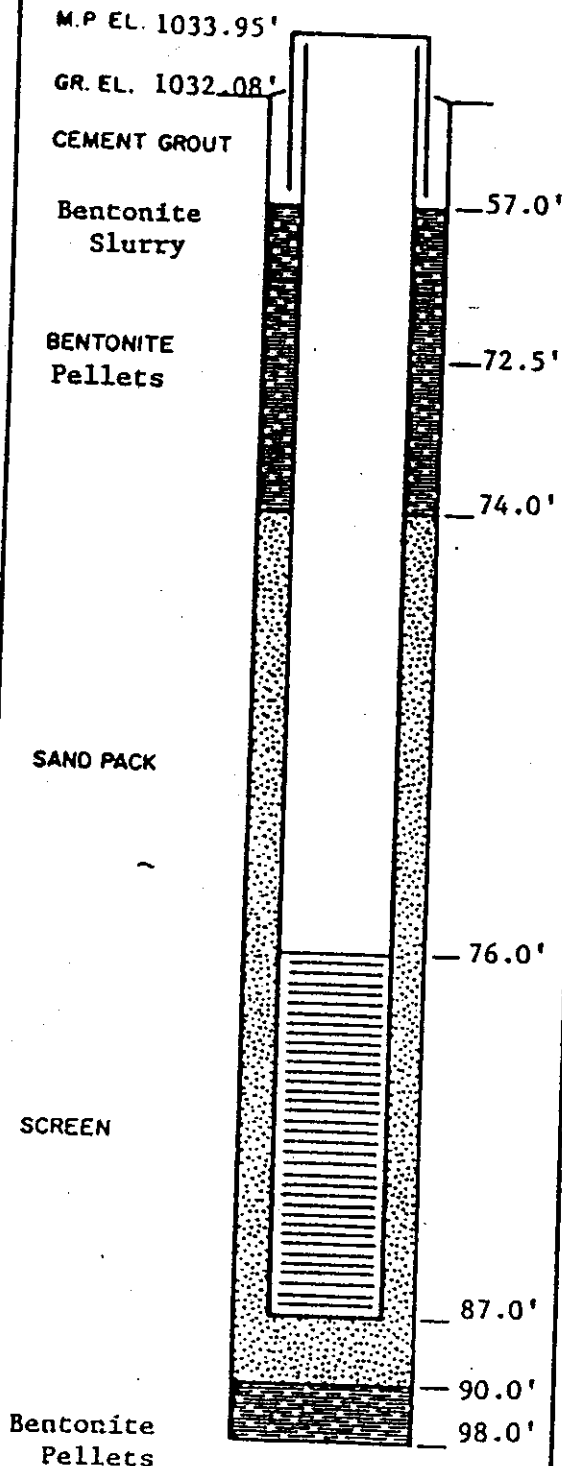
WELL NO. MW-10-D



DUNN GEOSCIENCE CORPORATION
 5 Northway Lane, North
 Latham, New York 12110
 (518) 783-8102

Project Kerry Chemical
 Client GHR
 Project No. 2006-3-4632
 Date Drilled 10/22 -27/86
 Date Developed 11/20/86

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Gordon M. Stevens
 Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring
 Static Water Level 1033.95' Date 11/24/86
 Measuring Point Top of riser
 Total Depth of Well 87.0' below grade
 Total Depth of Boring 98.0' below grade

Drilling Method
 Type Rotary Diameter 4" OD
 Casing

Sampling Method
 Type Split Spoon Diameter 3"
 Weight 140# Fall 30"
 Interval Continuous/Standard

Riser Pipe Left in Place
 Material SS Diameter 2"
 Length 77.98' Joint Type Flush

Screen
 Material SS Diameter 2"
 Slot Size 20 Interval 76.0' - 87.0'
 Stratigraphic Unit Screened Till/Glacial Ice-Contact

Filter Pack
 Sand 4QROK Gravel Natural
 Amount Interval 74.0' - 90.0'

Seal(s)
 Type Bent. Slurry Interval 57.0' - 72.5'
 Type Bent. Pellets Interval 72.5' - 74.0'
 Type Bent. Pellets Interval 90.0' - 98.0'

Locking Casing Yes ☒ No ☐

Notes:

Bedrock @ 90.0'

MONITORING WELL COMPLETION LOG

WELL NO. MW-11



DUNN GEOSCIENCE CORPORATION

5 Northway Lane, North
Latham, New York 12110

(518) 783-8102

Project Kerry Chemical

Client GHR

Project No. 2006-3-4632

Date Drilled 11/17/86

Date Developed 11/21/86

WELL CONSTRUCTION DETAIL

M.P. EL. 1034.57'

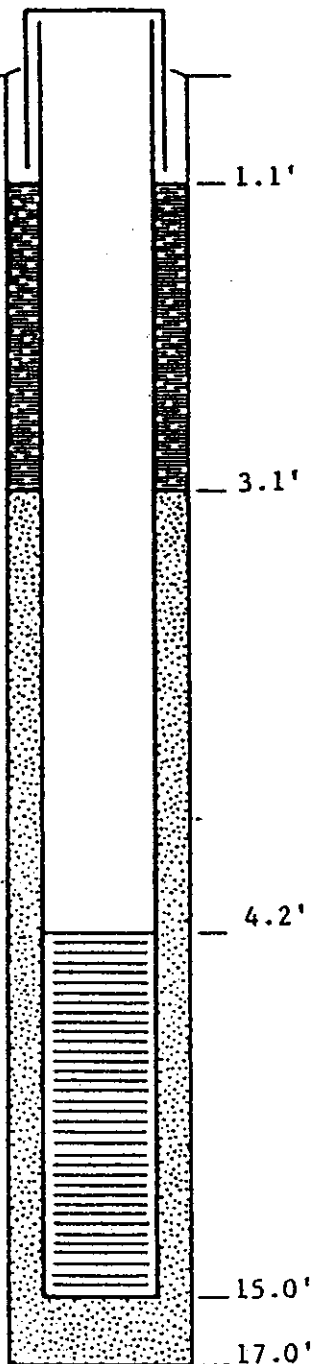
GR. EL. 1032.65'

CEMENT GROUT

BENTONITE
Pellets

SAND PACK

SCREEN



NOT TO SCALE

Inspector Walter O. Howard

Drilling Contractor Deliz/Elice & Co., Inc.

Type of Well Monitoring

Static Water Level 1030.98' Date 11/24/86

Measuring Point Top of riser

Total Depth of Well 15.0' below grade

Total Depth of Boring 17.0' below grade

Drilling Method

Type Rotary HSA Diameter 4 1/2" ID

Casing

Sampling Method

Type split spoon Diameter 3"

Weight 140# Fall 30"

Interval Standard

Riser Pipe Left in Place

Material SS Diameter 2"

Length 6.05' Joint Type Flush

Screen

Material SS Diameter 2"

Slot Size 20 Interval 4.2' - 15.0'

Stratigraphic Unit Screened Glacio-lacustrine/
Fill

Filter Pack

Sand 4 QROK Gravel Natural

Amount Interval 3.1' - 17.0'

Seal(s)

Type Bent. Pellets Interval 1.1' - 3.1'

Type Interval

Type Interval

Locking Casing Yes ☒ No ☐

Notes:

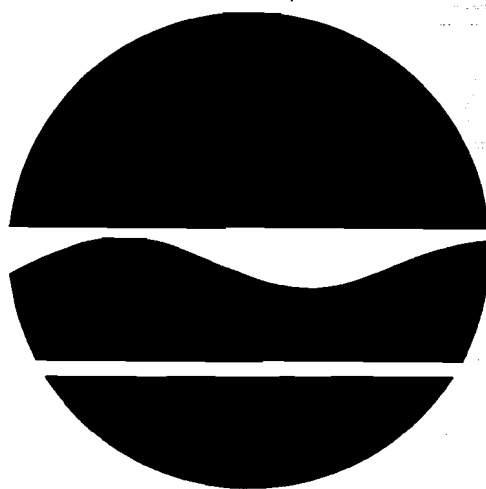
APPENDIX E RECORD OF DECISION

Kerry Chemical Company Site

Delaware County, New York

Site Number 4-13-001

New York State Superfund Record of Decision



December 1990

PREPARED BY:

NEW YORK STATE

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

50 Wolf Road, Albany, New York 12233

THOMAS C. JORLING, *Commissioner*

KERRY CHEMICAL COMPANY SITE

Delaware County, New York
Site Number 413001

**NEW YORK STATE SUPERFUND
RECORD OF DECISION**

December 1990

New York State Department of Environmental Conservation

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Kerry Chemical Company Site, Route 268, Town of Hancock, Delaware County, New York - Site ID #413001.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Kerry Chemical Company Site, developed in accordance with the New York State Environmental Conservation Law (ECL), and is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USL Section 9601, et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Appendix A of this record lists the documents that comprise the Administrative Record for the Kerry Chemical Company Site. The documents in the Administrative Record are the basis for the selected remedial action.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The remedy for this site consists of excavation followed by thermal destruction of the wood tar that presently exists on-site in lagoons and surface flows. Thermal destruction will take place on-site using a commercial transportable incineration of the rotary kiln or circulating bed combustion technology. The unit will be transported to, and assembled on-site to operate until all wood tar waste has been excavated and destroyed.

The components of the selected remedy are as follows:

- Improvement of the site access road to allow passage of heavy vehicles and equipment.
- Construction of a surface water diversion swale to intercept and divert around excavation areas the spring water which flows across the site.
- Demolition and removal of the existing, unstable buildings and stack on-site.
- Construction of a groundwater drain to lower the groundwater table below levels needed for excavation of the wood tar.
- Installation of a rip rap system along the near bank of the adjacent Cadosia Creek for protection against releases during construction.

- Excavation and placement in a contained, temporary storage area of the wood tar pits and tar flow areas after the clearing of vegetation. Excavated areas filled, graded and seeded. Wood tar deposits removed from the Cadosia Creek bed using hand tools and temporarily contained in the storage area.
- A rotary kiln or circulating bed combustor transported to the site, assembled and operated until all waste on-site is destroyed. (The thermal destruction process will be designed to operate with all the required air pollution controls).
- Based on chemical analysis of the resultant ash, and upon regulatory requirements and a cost analysis - ash transported off site for disposal, or disposal in a small landfill cell constructed on-site.
- Final grading and restoration.

DECLARATION

The selected remedy is designed to be protective of human health and the environment, is designed to comply with applicable State environmental quality standards and is cost effective. This remedy satisfies the Department's preference for treatment that reduces the toxicity, mobility or volume of hazardous substances, pollutants or contaminants as the principal goal.

Date _____

Edward O. Sullivan

Edward O. Sullivan
Deputy Commissioner
Office of Environmental Remediation

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I. SITE LOCATION AND DESCRIPTION

The Kerry Chemical Company Site is located 3/4 miles north of the Hamlet of Cadosia, in the Town of Hancock, Delaware County. The site encompasses approximately 10 acres and is 4/10 miles long in a north-south direction, bounded on the east by the Cadosia Creek and on the west by an abandoned railroad grade and steep hillside.

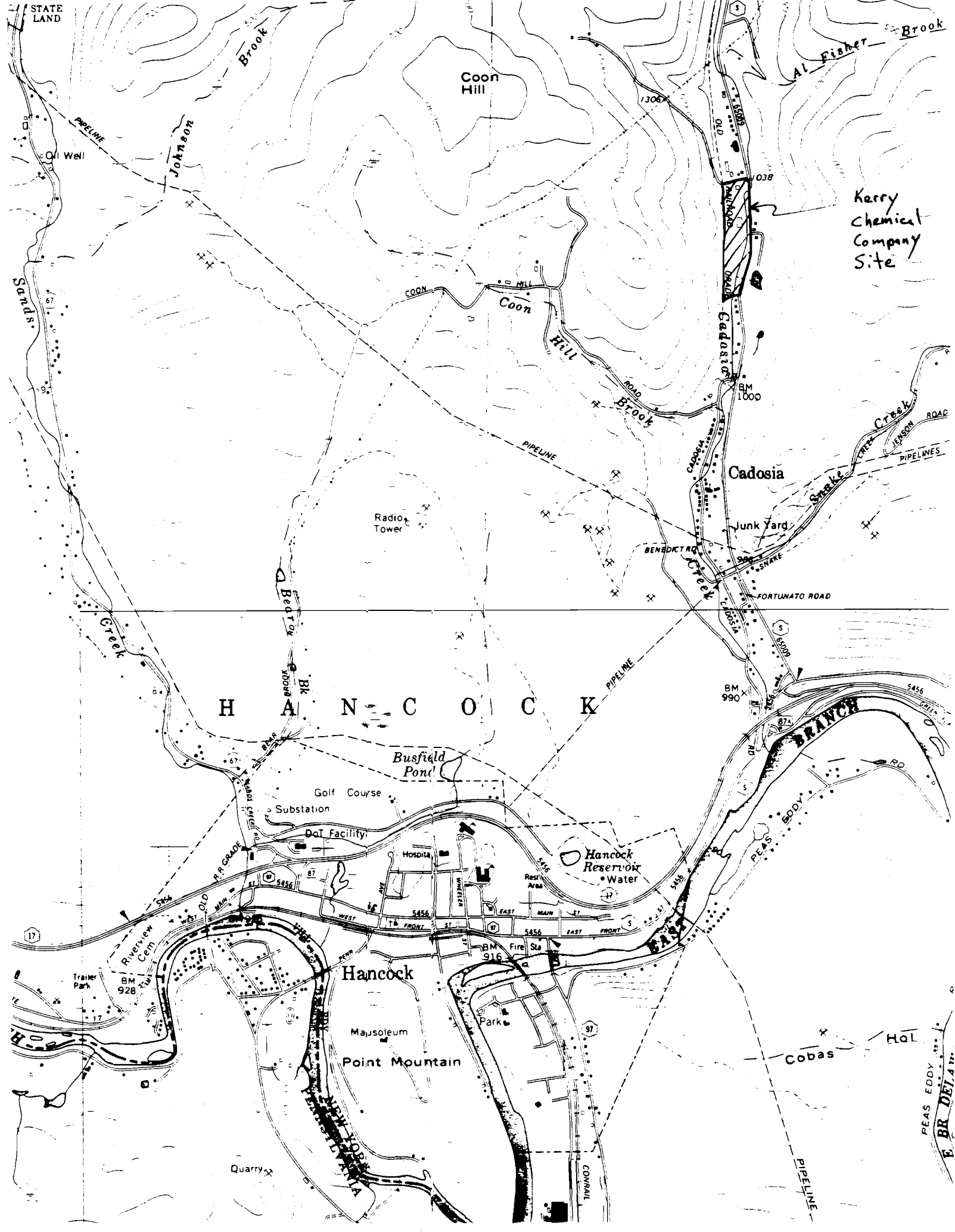
The site vicinity is a sparsely populated rural area of steep hills and glacial valleys, defined as part of the Appalachian Plateau. There are less than 10 residences within a half mile radius of the site. The adjacent Cadosia Creek flows into the East Branch Delaware River two miles downstream of the Kerry Site.

II. SITE HISTORY

The Kerry Chemical Company operated at this site from 1908 to 1949. The original intent of the plant operation was to utilize local hardwood trees to produce charcoal through a pyrolysis process. As chemical technology advanced, the process was improved to collect gasses liberated from the wood during heating. Condensing and distilling these gasses resulted in the production of methanol, methyl acetate, acetic acid, formaldehyde and acetone. The waste products of this process consisted of black or brownish tar-like substances which were pumped while hot to one of three on-site lagoons or directly into the Cadosia Creek. The facility was made up of at least nine buildings at that time.

Today, there are three decrepit buildings and a large smokestack still standing at the Kerry Chemical Site. The tar waste exists in five on-site lagoons ranging from 3-10 feet in depth. The waste is also seen in areas where it is flowing slowly overland as a thin surface layer. The total volume of waste on-site is estimated to exceed 3000 cubic yards. The waste has a viscous tar-like consistency which is almost solid in cold weather, yet decreases in viscosity and behaves more like a liquid in warm weather. Where exposed to air, the tar-waste emits a creosote odor. The intensity of odor emission is also temperature dependent. The smell of the tar on-site is strongest in warm weather.

In 1965, while a contractor for the NYS Department of Transportation (NYSDOT) was working to realign the Cadosia Creek adjacent to the Kerry Chemical Site during a highway project, a backhoe operator excavating along the creek's west bank inadvertently penetrated a tar lagoon. The large volume of tar that was released to the creek resulted in a major fish kill in both the Cadosia Creek and 2 miles downstream in the East Branch Delaware River. A ten foot high, 70 foot long sheet pile retaining wall was installed afterward by NYSDOT and remains in-place to support the creek bank and hold back the buried tar lagoon. Tar from on-site had also been released slowly to the creek over a period of several years through an old buried culvert. The culvert was plugged to prevent further discharge to the



Kerry
Chemical
Company
Site

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creek in 1986. The culvert was permanently cut off in Summer, 1989. At the far southern end of the site, the leading edge of the tar flowing overland has now reached the Cadusia Creek.

Historically, pets, domestic and wild animals had regularly been trapped and killed in the deeper tar lagoons in warm weather. Children had also become trapped in the tar occasionally, although no deaths were reported. Therefore, the known deep tar lagoons were fenced in 1985. Wild animals and pets are still killed in the tar lagoons.

III. CURRENT STATUS

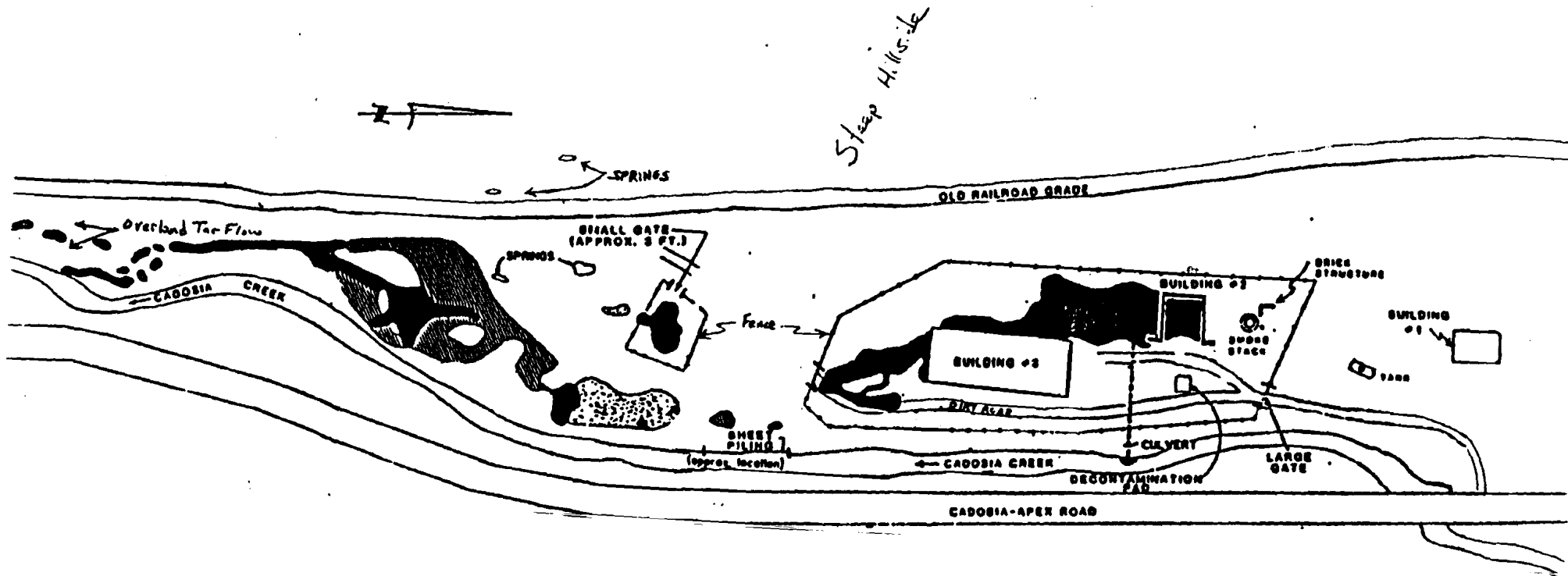
In 1986, GHR Engineering Associates was hired by the NYSDEC to carry out a Remedial Investigation/Feasibility Study (RI/FS) at the Kerry Chemical Site. The purpose of a Remedial Investigation is to determine the nature and extent of contamination at a site and to assess the associated risk to public health and the environment. To accomplish this at the Kerry Chemical Company Site, the following site investigation tasks were carried out during the RI: 29 exploratory test trenches were excavated, a detailed geophysical investigation was conducted, 21 groundwater monitoring wells were installed, and 11 soil samples, 6 surface water samples from the Cadusia Creek, 2 sediment samples, 21 on-site groundwater samples, 5 homeowner well samples and 6 tar samples were collected and analyzed for pollutant compounds.

A Feasibility Study is carried out using the data collected in the Remedial Investigation to identify and evaluate potentially applicable remedial actions. In the Kerry Chemical Site FS, each alternative was evaluated based on:

- Technical Factors including Performance
Reliability
Implementability/constructibility
Safety
- Institutional Analysis Factors (compliance with standards)
- Public Health Analysis Factors
- Environmental Analysis Factors
- Cost Factors

A. Major Findings of the Remedial Investigation

- The Kerry Chemical Site contains approximately 3500 cubic yards of wood tar waste. The waste is found in thin layers flowing overland and in five lagoons up to 10 feet in depth.
- The wood tar is made up of dozens of different organic chemicals including polycyclic aromatic hydrocarbons (PAHs), and several phenolic compounds in high concentrations (thousands of parts per million). The wood tar has a very high heat content: in excess of 8700 BTU/lb.
- The wood tar waste has been designated a hazardous waste by NYSDEC based on the chemical process by which it was generated.



-  SURFICIAL TAR DEPOSITS
-  SUBSURFACE TAR DEPOSITS
(DETERMINED BY HAND APPEARANCE)
-  WOOD MULCH/TAR MIXTURE

EXTENT OF CONTAMINATION

Scale 1" = 200'

Its designation according to 6 NYCRR Part 371.4 is as a K035 waste.

- Despite existing in direct contact for 50 to 80 years, groundwater underlying the site (usually found 4 to 8 feet below ground surface) has not been significantly contaminated by leaching from the tar deposits (found up to 10 feet below ground surface). The highest concentration of a Hazardous Substance List (HSL) compound detected in a well on-site was 21 parts per billion of dimethyl phenol. No chemical compounds were found in any of the five off site homeowner wells sampled. The conclusion drawn is that the tar matrix, which contains long chain polymers, prevents its chemical constituents from entering into water solution.
- The analysis of soil samples taken at the Kerry Chemical Site has shown that the wood tar's presence has not resulted in the contamination of site soils. Eleven soil samples were taken during test pit excavation and monitoring well installation. When analyzed, each of these soil samples, which were free of visible wood tar particles, were found to be clean. No Hazardous Substance List compounds were detected. Only those samples taken nearby which did contain visible tar were found to contain the dozens of organic chemical compounds characteristic of the tar. The conclusion is that the wood tar's chemical constituents do not "mix" with, or otherwise contaminate soil. When the clumps or pieces of wood tar are separated from soil, the adjacent remaining soil is clean.
- Surface water samples taken from the Cadosia Creek, which forms the site's eastern boundary and flows into the Delaware River 2 miles to the south, show that water in the stream is free of contamination. Samples taken of Cadosia Creek sediments however exhibit the presence of many of the chemical compounds found in the wood tar. As discussed above, these compounds were detected because the sediment samples contained visible clumps or particles of the wood tar.
- Contaminant migration off-site is not yet a major concern at this site. Wood tar constituents have not gone into solution in the water of the Cadosia Creek, nor to a significant extent in the groundwater. Low levels of HSL compounds were detected only in two wells, both upgradient of the site's boundaries. Since downgradient wells near the border of the site, and off-site wells, are free of contamination despite over 50 years of wood tar disposal, groundwater is not considered a route of contaminant migration. Warm weather overland flow of wood tar, however, is just now begining to result in off-site contamination. The leading edge of the tar flow is now entering the Cadosia Creek at the southeastern boundary of the site. A former route of contaminant migration was a buried culvert which originates under one of the tar lagoons and carried tar to its outfall at the Cadosia Creek. This was the source of much of the tar found in Cadosia Creek

sediments. Until it was temporarily plugged in 1986 and permanently cut-off in 1989, tar would seep onto the creek bank through this culvert during warm weather.

B. Risk Assessment

A human health risk assessment conducted was in the RI. The calculations in the risk assessment show that the greatest health risk would exist if groundwater in the area where the low contaminant levels were detected was used as a source of household water. This is not now the case, nor is it likely to be in the future. A significant carcinogenic health risk (estimated excess carcinogenic risk of 2.17×10^{-2}) was shown to exist in the case of adults eating fish caught in the Cadosia Creek, adjacent to the Kerry Site every day of the summer fishing season for their lifetimes. This is based on the assumption that contaminant levels in the fishes' flesh would be in equilibrium with those in the creek sediments.

Therefore, a quantifiable human health risk has been shown to result from releases to the Cadosia Creek from waste sources on the Kerry Chemical Site. As it slowly flows into the creek, the insoluble tar hardens and breaks down into small particles which join with creek sediments. Six of the polycyclic aromatic hydrocarbon (PAH) compounds which are found in the tar waste are suspected human carcinogens. When creek sediment is taken up by fish while feeding, the PAH compounds in the tar particles may be absorbed by the fish and may bioaccumulate.

Less readily quantified are two other human health risks whose source is the exposed tar lagoon surfaces at the Kerry Site. The first is posed by the continuous emission of air contaminants, especially during warm weather. Previous attempts to quantify air contaminant concentrations have failed, precluding risk calculations. Creosote-type odors from the waste are often noticeable on-site, and sometimes at the nearest homes, however, and may pose some risk. (Recent improvements in air analysis technology will be utilized during the Design and Construction phases to quantify air contaminant emissions.) Lastly, a serious human health impact would result from direct skin contact with the tar waste due to entrapment in an exposed lagoon. The odds of this event occurring are difficult to calculate, precluding risk calculation, but would likely be low due to warning signs and site fencing.

C. Need For Remedial Action

Long term risks to human health and the environment are posed by the Kerry Chemical Site if left in its present state. The threats range from catastrophic to slow-flow releases of tar to the Cadosia Creek, and from summertime air contaminate emissions to physical entrapment of animal and human trespassers in the tar lagoons.

- The sheet pile retaining wall installed in 1965 to hold back an on-site tar deposit, was inspected by a NYSDOT engineer in July 1987, and was found to be structurally sound. However, due to the fact that the site lies in the flood plain of the Cadosia Creek, the tar behind this wall and

several of the other deep tar lagoons are susceptible to catastrophic release during a severe spring flood. The result would be another major fishkill in the Cadosia and in the Delaware River downstream.

- The tar which flows over the ground surface in warm weather from the lagoon areas SSE to the creek, follows the path eroded by water from springs on the hillside along the site's boundary. The leading edge of the overland tar flow is presently reaching the creek bank. Successive years of scouring by spring water flow and warm weather tar movement is resulting in a slow continuous release of waste to the creek. The result is PAH contamination of the creek sediments.
- Although air monitoring attempts failed to quantify the vapor phase release of contaminants from the exposed tar lagoons, it is well documented that the odor of emissions from the tar are strong enough to cause dizziness and headaches for persons on-site during warm weather. Under these conditions the contaminant odors are sometimes detectable from some of the properties adjacent to the site. Although uncalculated, a risk may be posed by this route of exposure.
- Although the tar lagoons exposed at the surface are presently fenced to prevent access, wild and domestic animals are still regularly trapped and killed in them. In the long term, this can be expected to continue. The possibility also exists for human trespassers to inadvertently come in physical contact with the tar.

IV. DESCRIPTION AND EVALUATION OF REMEDIAL ALTERNATIVES

In order to address the need for remediation at the Kerry Chemical Site, GHR Engineering carried out a Feasibility Study which involved the formulation and evaluation of eight alternative remedial action plans. Because groundwater and surface water have not been significantly impacted by the site, groundwater and surface water remediation technologies are not considered in the FS. However, to varying degrees, all the remedial alternatives except No. 1 offer some reduction in the likelihood of any future impact on these resources.

A. Remedial Action Plan Alternatives

Alternative No. 1 - No Action. Consideration of no action is the baseline for evaluation of other alternatives. It was included in the detailed evaluation in accordance with program requirements. The only action envisioned under this alternative is continued Site monitoring.

Alternative No. 2 - Limited Response. Actions envisioned for this alternative would solve immediately pressing needs. The drainage run-on to the Site would be diverted away from tar areas, tar areas would be covered with soil and additional fencing would be provided. The stack and buildings would be removed from the Site. Monitoring would continue.

Alternative No. 3 - Containment. Implementation of this alternative would involve installation of a groundwater drain along the west side of the Site, placement of steel sheet piling and gabions on the west bank of Cadosia Creek, diversion of Site run-on, capping of tar areas with earth, removal of the stack and buildings, additional fencing, and continued monitoring.

Alternative No. 4 - Excavation With Off-Site Disposal. This alternative entails excavation of the tar, with disposal off-site. To ensure that releases to the Cadosia Creek are not experienced, sheet piling on the west side of the Cadosia Creek would be installed prior to excavation. The soil of the creekbank, and that separating the creek from excavation areas, will also be protected with rock riprap. A groundwater drain would be installed and the buildings and stack would be removed. Surface water run-on would be diverted. The Site would be re-graded with clean soil. A monitoring program would continue for a limited time period. Off-Site disposal would be at a permitted hazardous waste landfill (Alt. No. 4a) or incineration facility (Alt. No. 4b).

Alternative No. 5 - Excavation With On-Site Landfill. This alternative is the same as Alternative No. 4 except that the excavated tar would be landfilled on-Site in a designed landfill facility.

Alternative No. 6 - Excavation With Solidification and Off-Site Disposal. This alternative involves the same actions envisioned for alternative No. 4 except that the excavated tar soils would be solidified with lime and cement on-Site prior to transport off-Site for disposal.

Alternative No. 7 - Excavation With Solidification and On-Site Landfill. This alternative is the same as alternative No. 6 except that the excavated tar would be solidified with lime and cement prior to landfill on-Site in a designed landfill.

Alternative No. 8 - Excavation With On-Site Incineration. With this alternative, the elements of alternative No. 4 would be undertaken, but a mobile incinerator would be used at the Site to destroy the excavated tar.

B. Description of Evaluation Factors

The alternatives considered for remediation of the Kerry Chemical Company Site, including the NYSDEC's chosen alternative, are in compliance with the New York State Environmental Conservation Law (ECL). The goal of the Feasibility Study was to identify the alternative which best satisfies the following evaluation factors.

Technical Factors

In performing technical assessments of each alternative four criteria were addressed. These criteria are: performance, reliability, implementability and safety as discussed below.

Performance. Each alternative was judged both for its expected effectiveness and its useful life. Effectiveness addresses the ability of a measure to accomplish its design objectives, that is, its potential for success in alleviating the type of contamination problem which it is intended to remedy. Effectiveness of an alternative also is a function of how well components of the action can be integrated to provide an overall solution at the Site. Useful life of a measure is its anticipated service life without consideration for replacement, given that proper operation and maintenance procedures are performed.

Reliability. Key considerations for this criterion include operation and maintenance (O&M) requirements and the demonstrated success of the action at similar sites. O&M requirements include the availability of labor and materials for tasks as well as the frequency and complexity of the tasks necessary to keep the action effective once the original activities have been completed. Field tested methods have preference over technologies that have not been applied to actual site cleanup operations.

Implementability/Constructability. This factor deals with both the constructability of the alternative and time to achieve remediation. Constructability refers to the relative ease of installing or completing an action based on site-specific constraints such as waste characteristics, site access, or water table elevations. It requires an evaluation of the ability of a contractor to actually build, construct, or position the measure under consideration. The time to achieve the desired result covers the period from startup of the remediation until beneficial results are realized, irrespective of any measures taken initially to provide temporary protection to local citizenry or the environment.

Safety. This criterion addresses major threats posed to the contractor, Site personnel and the Site vicinity from activities related to remedial actions proposed. Major threats considered are potentials for fire or explosion and exposure to hazardous substances. At the Kerry Site a primary concern is health and safety protection of on-Site personnel during any remediation activity. Off-site impact due to remediation activities is unlikely.

Institutional Analysis Factors

The primary focus of the institutional analysis is the identification of potentially applicable Federal, state or local laws, regulations, policies and guidelines and the determination of, for each alternative, compliance and/or non-compliance with applicable requirements. Also considered as part of the institutional analysis are community needs and public policies as expressed in adopted plans such as zoning and long-term resources management programs.

PRESENT WORTH COST ESTIMATES FOR
REMEDIAL ALTERNATIVES AT THE KERRY CHEMICAL CO. SITE

NO.	ALTERNATIVES DESCRIPTION	ESTIMATED CAPITAL COSTS	O&M COSTS AS PRESENT WORTH	TOTAL ESTIMATED COST (PRESENT WORTH)
1	No Action	0	93,000	\$ 93,000
2	Limited Response	357,600	93,000	456,000
3	Containment	1,452,400	93,000	1,545,400
4	Excavation with Off-Site Disposal			
	a. - with off-Site landfill	3,108,700	0-37,700	3,146,400
	b. - with off-Site incineration	7,595,700	0-37,700	7,633,400
5	Excavation with On-Site Landfill	1,932,900	240,000	2,173,000
6	Excavation with Solidification and Off-Site Disposal	4,902,500	0-36,400	4,939,000
7	Excavation with Solidification and On-Site Landfill	3,024,000	240,000	3,264,000
8	Excavation with On-Site Incineration			
	- with rotary kiln	4,875,000	0-238,000	5,113,000
	- with CBC	5,830,000	0-238,000	6,068,000

Public Health Analysis Factors

Public health considerations were an integral part of the Kerry Study. The primary criteria developed and used in the public health risk assessment were: Carcinogenic Risk (for contaminants identified as carcinogenic); and Fraction of Acceptable Daily Intake (ADI) for non-carcinogens. The primary health concern posed by the Kerry Site results from on-Site direct (dermal) contact with the tar and contaminant releases to the air under hot weather conditions. Safety issues were also addressed in this part of the evaluation.

Environmental Analysis Factors

The environmental analysis of alternatives addresses, as applicable, potential beneficial and adverse impacts on surface water, groundwater and the air. Also addressed were impacts on the natural and biological environment including wetlands, habitats and floodplains, along with human use aspects such as recreational resources.

Cost Factors

Analyses of alternatives require both technical and economic evaluation in order to develop the most cost-effective remedial action. In the cost analysis estimates of expenditures required to complete each measure were developed in terms of both capital and O&M costs. Once these figures were determined for each alternative, present work and annual costs were calculated to facilitate comparative evaluation. Two EPA guidance documents were used for reference in the cost analysis. These EPA documents are:

1. "Remedial Action at Waste Disposal Sites", (10/85), and
2. "Remedial Action Costing Procedures manual", (9/85).

The accuracy of costs developed for feasibility studies are typically in a range of +50 to -30 percent. Estimates developed for this feasibility study were targeted to fall in this range.

C. Comparison of Remedial Alternatives

The greatest complexities in carrying out remediation of the Kerry Chemical Site will result from any activity where handling of the tar is involved. Excavation and movement of the tar will be physically difficult due to its viscosity and stickiness. But more importantly, detailed calculations in the Remedial Investigation have predicted that the emissions of air contaminants from the tar will increase when the tar is disturbed. All of the remedial alternatives from Alternative No. 4 through No. 8 involve excavation of the tar and its associated difficulties. These difficulties must be offset by a resultant benefit in the form of reduced or eliminated risk to human health or the environment posed by the site once a chosen remedy is carried out. Otherwise, the remedy will not have been worth the difficulties and potential air contaminant releases involved in disturbing the tar.

Alternatives Nos. 4, 6 and 8 all result in the site being free of tar at the project's completion. This complete removal of the contaminant source from the site addresses all of the issues listed above under the "Need For Remedial Action" and justifies the difficulties of excavation of the tar. Alternative No. 8 and Alternative No. 4b, the incineration alternatives, both have the added benefit of being "permanent remedies." Permanent remedies, those that permanently reduce the toxicity, volume, and/or mobility of the hazardous waste are preferred for choice under state and federal regulations. Alternative No. 6 and Alternative No. 4a, both with off-site landfill, are therefore less attractive because the waste would still exist, buried now in a permitted landfill elsewhere. Recent legislation banning the land burial of certain hazardous wastes may apply to the Kerry Chemical tar, and if so would preclude the choice of Alternatives 6, 4a, and also Nos. 5 and 7.

Alternative Nos. 5 and 7 would result in the entire volume of tar being still present on the Kerry Site at the project's completion. With the contaminant source still on-site, some of the issues listed in the "Need For Remedial Action" would still be potential concerns. Although Alternative No. 5 is a technical improvement over no action because the tar is reburied in a designed landfill facility on-site, and Alternative No. 7 has the added improvement of removing the mobility of the tar through solidification prior to reburying in an on-site landfill, neither has removed the source from the site and may not justify the complexities and difficulties of excavation of the tar.

Alternative No. 7, solidification and on-site landfilling of the tar, and Alternative No. 6, solidification and off-site landfill, are meant to be improvements on Alternative Nos. 5 and 4a, respectively, which are equivalent remedies without the solidification step. The benefit of carrying out the on-site process of heating the excavated tar, mixing it with lime and cement, and pouring the mixture into block molds to solidify, is that the stickiness and flowability of the tar is absent from the solid tar blocks which result. GHR Engineering, using tar samples from the Kerry Site, concluded that their lime and cement solidification method provided the best results after experimenting with various chemical mixtures and investigating commercially available solidification techniques.

There are, however, many drawbacks to both the solidification process and the properties of the solidified tar which severely detract from the attractiveness of these remedies:

- * The solidification process would greatly increase the amount of waste handling to take place on-site, and therefore increase the difficulties associated with handling this tar. The greatest of these will be the further increase in air contaminant emissions which will result from the heating and mixing of the tar in a large mixing vessel on-site.

- * Solidification would approximately double the volume of tar material. This would lead to far greater costs for the ultimate disposal of the solidified tar, whether that disposal involved the construction of an on-site landfill or transport off-site for disposal at a permitted hazardous waste landfill.
- * The solidified tar has no noticeable reduction in odor from air contaminant emissions. Bench scale solidification of tar samples from the site were carried out during the Feasibility Study and the properties of solidified tar were examined. There was no noticeable difference in the phenolic smell given off by solidified and unsolidified tar samples. The conclusion drawn is that solidification will provide no benefits in terms of air concerns.
- * The solidified tar samples from the F.S. bench scale tests were of a light, porous, crumbly, chalk-like consistency. Although leachability tests were inconclusive, it seems intuitively likely that the tar in this form would be more able to leach contaminants into water solution than pure tar. The pure tar has not leached significant contaminants into groundwater despite 50-70 years of its existence on-site. With increased surface area due to its porosity and crumbliness, the solidified tar would have a much greater potential for leaching contaminants to water.

Solidification alternatives can be ruled out as discussed above, due to the added cost, complexity and risk involved in the process of solidification, and due to the lack of improvement in properties of the resultant tar. If the goals of source removal and permanency of remedy were not considered important, Alternative No. 3, containment of the wastes at their present locations, would be the most attractive remedy. For a low cost, the waste would be stabilized and protected from further movement, surface water contact and flood waters without the materials handling and air contaminant issues involved in excavation of the tar.

Understanding the necessity of source removal, but continuing to ignore the preference for a permanent remedy, Alternative No. 4, excavation with off-site landfill, would be considered the most attractive remedy. Its cost is the lowest of the remaining alternatives and the goal of source removal is accomplished. However, NYSDEC's policy on choosing a remedial technology encourages use of permanent rather than containment-oriented remedies. This policy is aimed at restoring sites to productive use and eliminating long term monitoring and operation and maintenance costs. Considering this, the Remedial Alternatives involving off-site and on-site incineration appear to provide the greatest benefit and justification for excavation of the tar at the Kerry Chemical Site. Of the two incineration alternatives, on-site incineration, Alternative No. 8, is preferable based on the analysis of cost factors.

The Feasibility Study carried out a detailed evaluation of Remedial Alternatives based on the five evaluation factors and the facts discussed above. The Feasibility Study Report contains the complete evaluation details for each alternative.

At NYSDEC's request, GHR Engineering investigated the feasibility of alternative methods of disposal of the Kerry Chemical tar. As part of the Post-Feasibility Study Tasks assigned by NYSDEC, GHR researched and contacted the operators of dozens of active cement kilns, refuse incinerators, conventional oil burners, and industrial incinerators to determine if any would be willing to utilize the high BTU value of the Kerry tar as a free fuel supplement to their existing incineration operations. Despite an extensive search, no interested parties were found. These efforts are documented in GHR's Report on Post-Feasibility Study tasks. NYSDEC also investigated, without success, the possibility of destroying the Kerry tars in the coal burning incinerator of a New York State utility company along with the coal tar the utility is excavating from a hazardous waste site of its own.

V. SELECTED REMEDY

After extensive investigation, examination, and internal review, the Remedial Alternative chosen by NYSDEC as most appropriate for implementation at the Kerry Chemical Site is excavation and destruction of the tar using on-site incineration: Alternative No. 8. In this alternative, thermal destruction of the waste may be carried out using circulating bed combustion (CBC) technology or rotary kiln technology. The choice of incineration technology will be made during the Remedial Design phase of this project. These two technologies were both found to be the most appropriate and technically applicable incineration technologies available for the Kerry Chemical Site waste.

A more detailed summary of the tasks to be carried out as part of the chosen Remedial Alternative is contained below. The associated costs of this remedy are summarized in the table included within.

A. Rationale For Selection

The high BTU value of the tar waste makes it an excellent incineration candidate and will reduce incineration costs by eliminating the need for significant auxiliary fuel. Both of the incineration technologies recommended can and would be fitted with effluent gas treatment systems to comply with all requirements placed on the quality of stack gas. In terms of air emissions during remedial action, those emanating from disturbed tar exposed to air will be of greater magnitude, and more difficult to control, than any resulting from incineration of the tar. There are several options available for containing air emissions from the tar excavations: flooding the excavations with water during tar removal, use of vapor suppressing foams, conducting excavation within framed, tent-like enclosures having air continuously removed from inside and treated, excavation in cold weather, etc. This choice will also be part of Remedial Design. Lastly, a small landfill cell could be constructed on-site for disposal of the incinerator ash. The other option for ash disposal is to transport it off site for disposal.

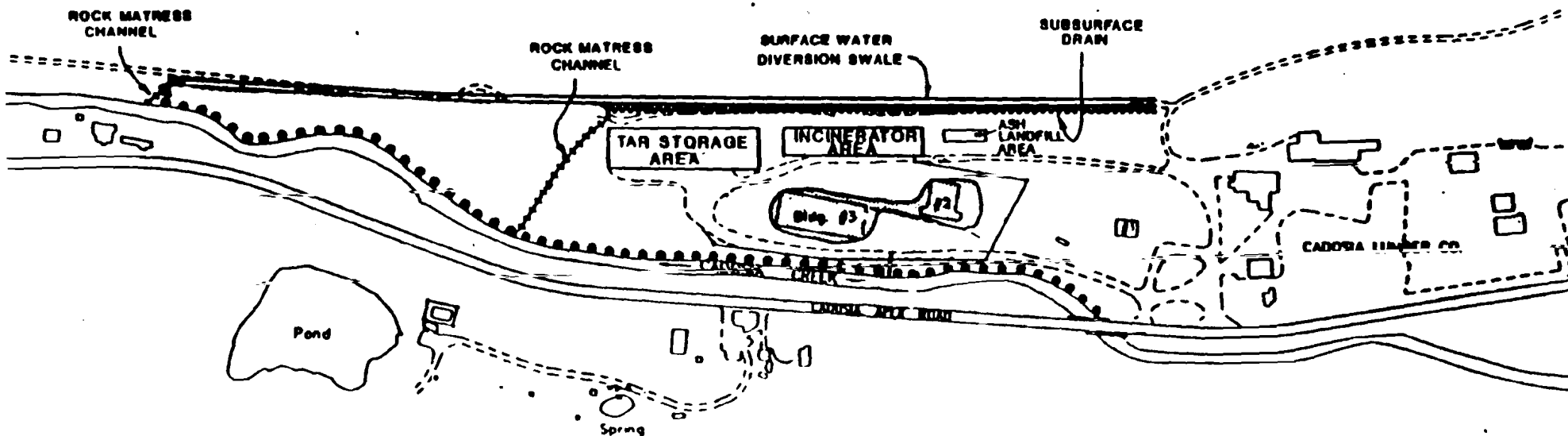
During the Remedial Design process, specific methods and equipment for carrying out all of the tasks outlined below will be determined by conducting all the research, calculations, benchscale testing and trial burns necessary to design an efficient, environmentally sound remedial program which meets or exceeds all applicable or relevant and appropriate regulations and standards. Valuable information will be provided by the U.S. Environmental Protection Agency's experiences remediating the Westline Site in Westline, Pennsylvania, approximately 15 miles from the New York border at Cattaraugus County. This National Priority List site contained wood tar waste identical to that of the Kerry Chemical Site, which was successfully destroyed using rotary kiln technology. The experience gained by USEPA's efforts at the Westline Site will prove invaluable in designing and conducting the Kerry Chemical Site cleanup both in terms of their successful excavation and handling of the tar and their successful use of rotary kiln incineration to destroy the tar.

In summary, this choice of remedy complies with the laws which provide the basis for the New York State remedial program: Article 27, Title 13 of the New York State Conservation Law, Public Law 96-510 (the Comprehensive Environmental Response, Compensation and Liability Act of 1980) and Public Law 99-499 (the Superfund Amendments and Reauthorization Act of 1986). These laws include guidance for the choice of remedies for hazardous sites and define types of remedies which must be given preference.

A preference must be given to remedies which are permanent; that is, remedies which result in the reduction of mobility, toxicity and volume of the waste. The incineration remedy chosen for the Kerry Site meets this requirement on all counts. Solidification, which was part of several remedial alternatives not chosen for this site, is not considered a permanent remedy for wastes with high organic content like the Kerry Chemical Company's wood tar. In addition, the laws require that when a non-permanent remedy is chosen for a site, the remedial action must be reviewed every five years to determine if human health and the environment are being adequately protected, and whether a permanent remedy is available.

A preference must also be given to remedies which utilize treatment technologies that have been successfully utilized at other inactive hazardous waste sites. As discussed above, this requirement is met by the chosen remedy for this site since rotary kiln incineration was successfully used to destroy identical waste from the Westline Federal Superfund Site.

2 →



LEGEND

- SURFACE WATER DIVERSION SWALE
- ~~~~~ SUBSURFACE DRAIN
- STREAM BANK RIP-RAP
- ROCK MATRESS CHANNEL
- [] CAPPED AREAS

SCALE IN FEET
0 200 400

CONCEPTUAL SITE PLAN
ALTERNATIVE No. 8

GHR Engineering Associates Inc.
KERRY CHEMICAL CO SITE
HANCECO, NEW YORK

B. Detailed Description and Cost Estimate of Remedy

The remedial action plan chosen (Alternative No. 8) for the Kerry Chemical Company Site will involve a number of components. In brief, the plan is comprised of the following:

1. Improvement of the Site access road from Cadosia-Apex Road to allow passage of heavy vehicles and equipment.
2. Construction of surface water diversion swale along the west side of the site. This swale will intercept surface water that now runs across the Site area at certain times of the year, especially in the spring. Diversion of these waters will assist in eliminating water-tar contact and potential for tar releases and will also afford dry conditions for further remedial work.
3. Demolition and removal of the existing deteriorated stack and buildings that are present on the site. This will eliminate long term safety hazards and will also facilitate the cleanup work that would otherwise be precluded in the proximity of structures due to the safety hazards they present.
4. Construction of a subsurface groundwater drain along the western side of the site. This drain will permanently lower the high groundwater table at the Site which will be highly beneficial in subsequent tar removal activities.
5. Installation of a riprap system along the west bank of Cadosia Creek. The riprap installation proposed will include, for purposes of protection against releases during construction, temporary steel sheet piling and rock riprap. A filter fabric material will be installed under the riprap. Installation of this system will reduce potential further tar releases to Cadosia Creek.
6. Excavation and removal of tar from tar pits and tar flow areas. After vegetation is cleared from areas to be excavated, the tar will be carefully removed from pits and tar flow areas and will be placed in a contained storage area on the western side of the Site. Excavated areas will be filled, graded and seeded. Wood tar deposits will be removed from the Cadosia Creek bed using hand tools and will be placed in the contained storage area.
7. Thermal destruction of the tar collected in the contained storage area using a commercial transportable incinerator of the rotary kiln or circulating bed combustion (CBC) technology, assembled and operated on-site.

COST SUMMARY - ALTERNATIVE NO. 8
EXCAVATION WITH ON-SITE INCINERATION

COST ITEM	ESTIMATED CAPITAL COST
1. Improve Site Access	\$ 8,000.00
2. Demolition of Stack and Building with Off-Site Disposal	102,000.00
3. Remove Culvert with Off-Site Disposal	28,900.00
4. Surface Water Diversion Swale	48,000.00
5. Tree and Brush Clearing	8,400.00
6. Remove Fencing	1,400.00
7. Containment Along Cadysia Creek	440,000.00
8. Upgradient Subsurface Drain	80,000.00
9. Steel Sheet Piling Around Tar Pits	130,000.00
10. Dewatering	32,000.00
11. Excavate Tar and Stockpile	224,000.00
12. On-Site Incineration (CBC Unit)	(3,114,000.00)
(Rotary Kiln)	(1,959,000.00)
13. Backfill, Grade and Seed	63,000.00
14. Wastewater Disposal From Scrubber (CBC Unit)	(0.00)
(Rotary Kiln)	(200,000.00)
15. Landfill for ash disposal	20,000.00
SUBTOTAL CBC UNIT	4,300,000.00
SUBTOTAL ROTARY KILN	3,345,000.00
16. Engineering Costs @ 20%	765,000.00
17. Contingency Costs @ 20%	765,000.00
TOTAL CAPITAL COSTS - CBC UNIT	5,830,000.00
TOTAL CAPITAL COSTS - ROTARY KILN	4,875,000.00

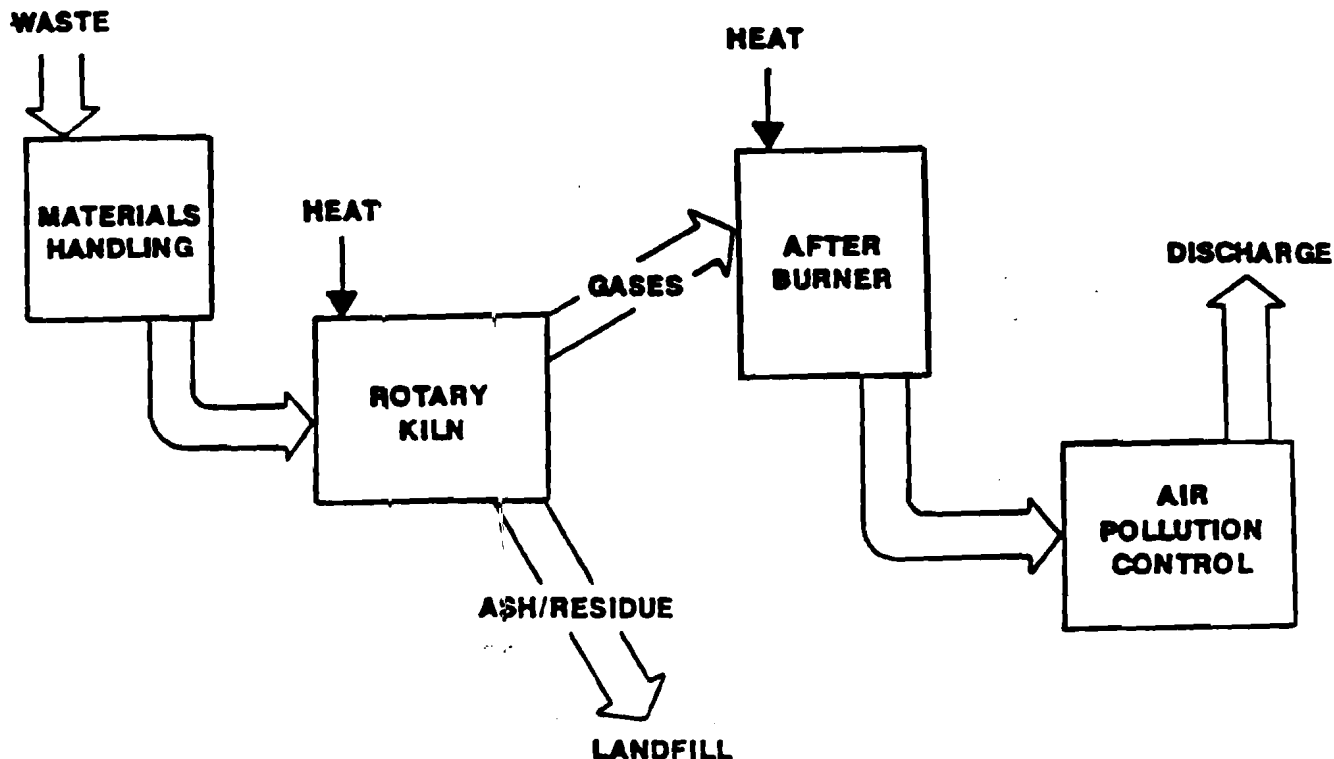
TASK/ITEM (LEVEL OF PROTECTION)	QUANTITY	UNIT COST	TOTAL COST
<u>O & M Costs As Present Worth</u>			
1. Fence maintenance for 30 years	30 years	\$1,500/YR	\$14,000.
2. Monitor semi-annually: 5 water samples	30 years	\$19,200/YR	\$180,000.
3. Collect leachate semi-annually			
Labor	30 years	\$1,400/YR	\$13,000.
Disposal	4 drums/yr	\$210/Drum	\$8,000.
4. Regrade and seed after 10 years of settlement	24,000 SF	\$2.41/SF	\$22,000.
Mob and demob costs	2 pieces	\$600/piece	\$460.
<u>TOTAL O & M COSTS - ALTERNATIVE NO. 8</u>			\$238,000.
	CBC UNIT		\$6,068,000.00
	ROTARY KILN		\$5,113,000.00

8. Disposal of incinerator ash in an on-site landfill. A landfill cell could be constructed on-site for disposal of ash which results from thermal destruction of the tar. The landfill cell could be designed with double composite liner and cap to prevent infiltration of precipitation. Alternately, the ash could be transported off site for disposal. This decision will be made based on chemical analysis of the ash generated, regulatory requirements and cost analysis.
9. Final grading and restoration. Residual foundation areas near the former locations of buildings and the materials storage and process areas would be filled, graded and seeded. On-site drainage would be provided by grading and disturbed areas would be seeded.

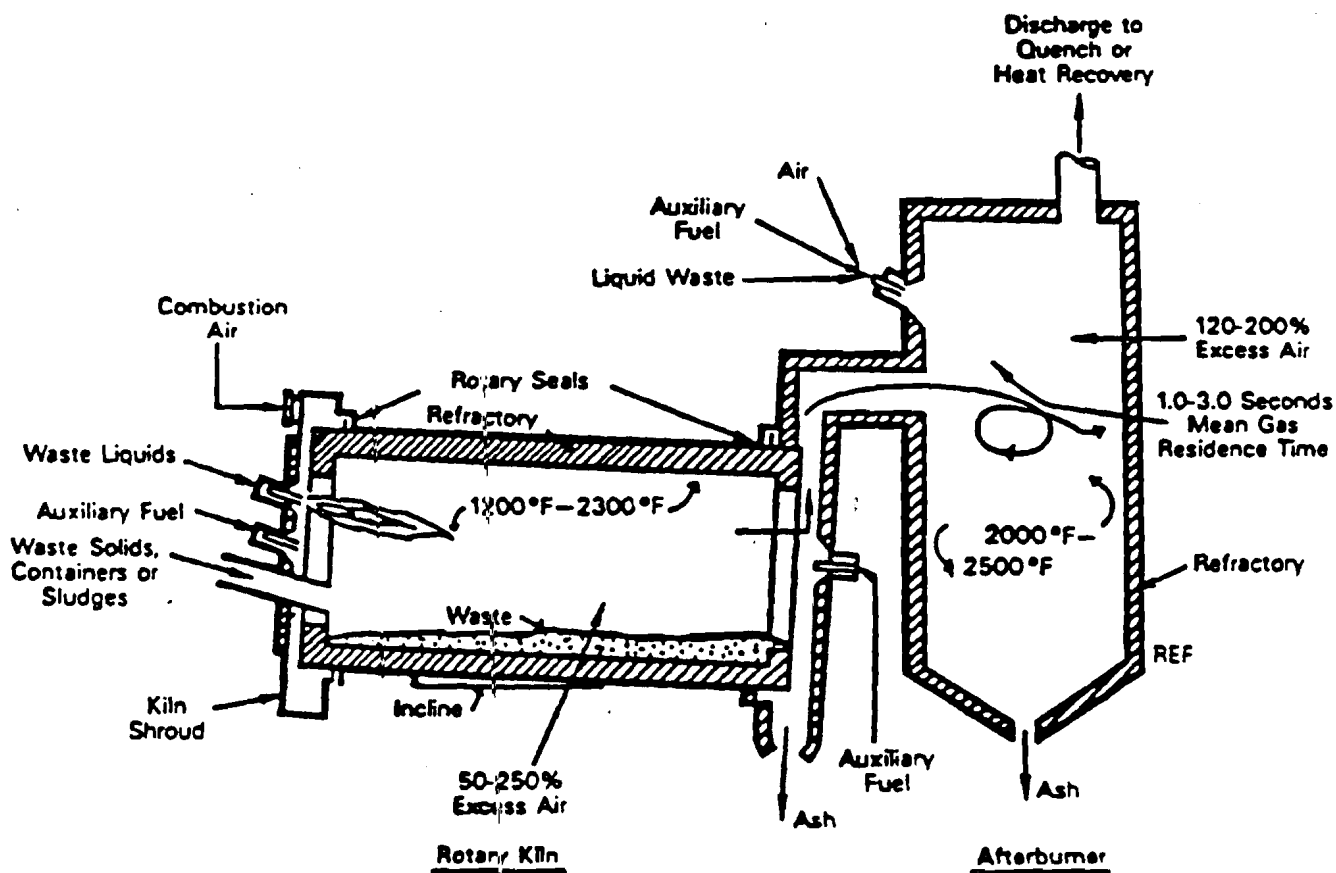
CANDIDATE INCINERATION TECHNOLOGIES

As discussed above, the use of the rotary kiln and fluidized bed (specifically, the circulating bed combustor) technologies were selected as the most appropriate for thermal destruction of the Kerry tar. Vendors of these technologies report mobile or transportable units are available for on-Site use.

Rotary Kiln. The rotary kiln has a long-term record of use for commercial applications (i.e., cement kilns) and more recently, for hazardous waste destruction. Rotary kilns are perhaps the most versatile and widely used systems for destruction of hazardous wastes, having the capability for handling a wide range of liquids, solids and sludges. The rotary kiln system would consist of four major components: the materials handling system; the rotary kiln unit; an after burner and an air pollution control system. Included herein is a schematic process diagram for a rotary kiln system. A wet venturi scrubber air pollution control device would be used to control air emissions, particulates and acid gases, prior to discharge through the stack. It is estimated that effluent from a scrubber used on a rotary kiln at the Kerry Site would receive treatment prior to discharge. Based on soils contaminated with similar wastes, also containing polynuclear aromatic hydrocarbons (PAHs), the results of analytical tests on bottom ash from incineration show that PAHs were not detected in the ash residues. Test burns and actual bottom ash testing would be required, but the bottom ash from incineration of the Kerry Waste is expected to be free of hazardous materials, primarily the inert soil fraction of the incinerated material. If test results or regulatory requirements dictate that a secure landfill would be required, then such a design would be implemented, for costing, it was assumed that a secure landfill would be required on-Site. The location of the landfill is shown in the conceptual site plan diagram.



**SCHEMATIC PROCESS DIAGRAM -
ROTARY KILN INCINERATION SYSTEM**



ROTARY KILN SCHEMATIC

Circulating Bed Combustor (CBC). The CBC is a modification of the fluidized bed technology. As in the CBC diagram included herein, waste is introduced into the combustor loop where it is entrained in high velocity air which carries it upward through the combustor. The hot cyclone separates the gasses from the solids. The gasses pass through a flue gas cooler and then to a baghouse where particulates are removed from the gas stream prior to exhausting through the stack. Solids carried downward in the cyclone are reintroduced to the combustor via a proprietary seal system. Heavier solids are removed from the lower bed by a water cooled ash conveyor. It is expected that the ash from the Kerry waste would be inert and amenable to filling on-site. Because high turbulence is maintained in the combustion zone, temperatures are relatively constant in the entire loop and temperatures can be maintained at relatively low temperatures, with very high destruction efficiency maintained.

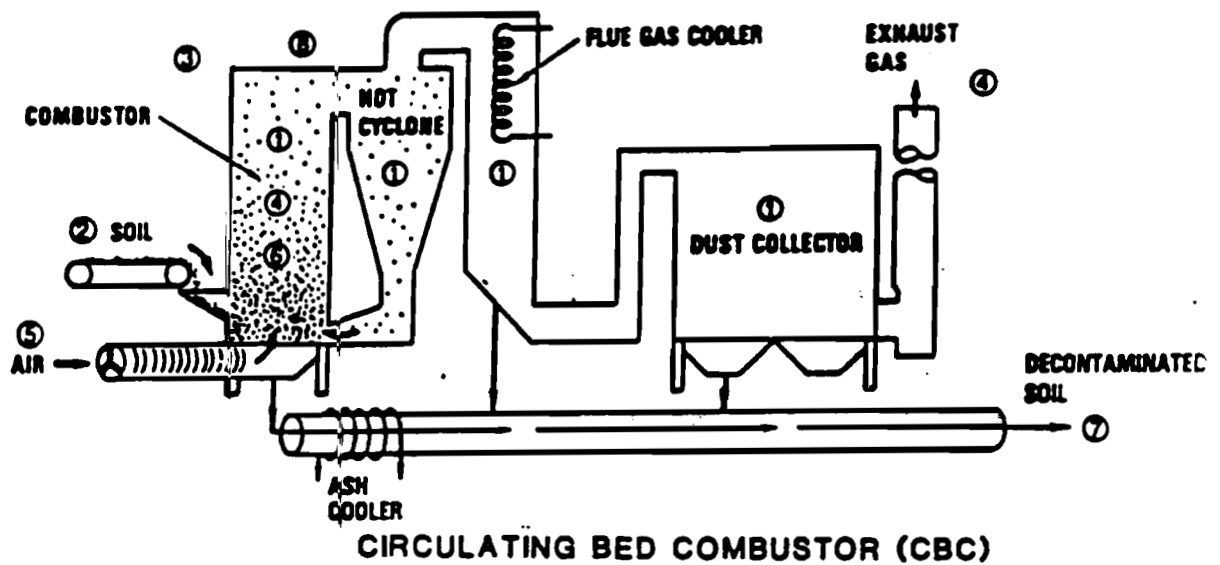
Limestone may be added to the process to neutralize acid gasses. CO and NOx emissions are controlled by thorough mixing, lower combustion temperatures and the introduction of secondary air at higher locations in the combustor. According to vendor information, needs for afterburners and scrubbers are eliminated. This will be more closely examined, however, in the Remedial Design Phase.

The 36-inch CBC transportable unit is relatively compact, having outside dimensions of about 50 feet by 30 feet in total. A plant layout drawing by the vendor is provided.

VI. PUBLIC PARTICIPATION

As part of the RI/FS, a public participation and community relations plan was developed for the Kerry Chemical Company Site in April 1989. The principal objectives of the Citizen Participation Plan were:

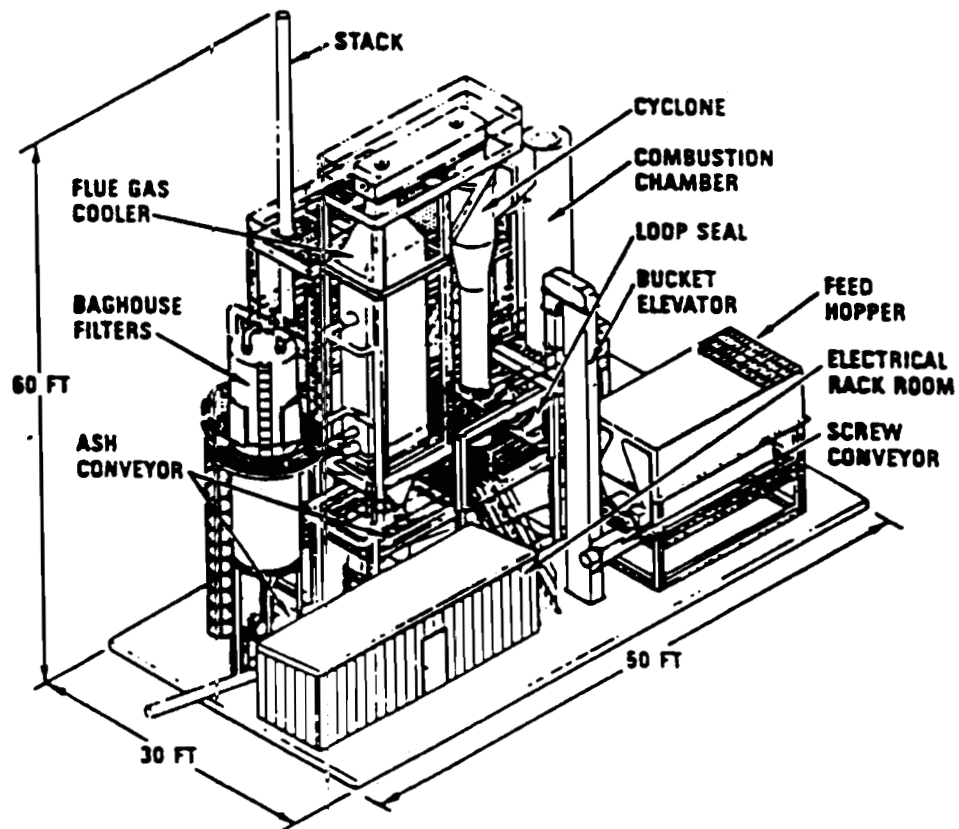
1. To provide area residents with an understanding of the New York State Superfund process. Such an understanding promotes realistic public expectations about the activities, complexities and time involved with site investigations.
2. To provide accurate, understandable information concerning all phases of the Kerry Chemical Site RI/FS program to interested citizens. NYSDEC worked with elected officials of the area to identify and fulfill the information needs of the community. Information was disseminated through public access to documents, through press releases and a public meeting.



SCHEMATIC

SOURCE: OGDEN ENVIRONMENTAL SERVICES

36-IN. TRANSPORTABLE STANDARD SOILS PLANT



3. To provide the community the information needed to express their views and to discuss issues of concern with NYSDEC during the RI/FS process. Documents and data were made available for public review. Citizens and town officials were asked to express their views and discuss issues of concern with NYSDEC. Then at key milestones, community input was solicited from area residents and town officials.
4. To establish a good relationship with the local media so that accurate information about RI/FS activities would be reported. An important goal of the public participation program was to keep media informed about the project and to obtain accurate newspaper, television and radio coverage of RI/FS activities.

A State Superfund contract was signed in July 1986 with GHR Engineering Associates to perform a Remedial Investigation/Feasibility Study. The following public participation activities have since been carried out:

1. Document repositories were established at Hancock Town Hall, Read Public Library in Hancock and the NYSDEC Region 4 sub-office in Stamford. All pertinent reports and documents related to the RI/FS have been promptly placed there throughout the project.
2. Upon completion of the Remedial Investigation and again for the Feasibility Study, the draft reports prepared by GHR Engineering were provided to town officials and placed in the repositories. The town officials and area residents were asked to provide input for revision of these draft reports. The final RI Report and final FS Report which resulted were then also provided for review.
3. On July 19, 1990 a Public Meeting was held in Hancock to discuss the findings and conclusions of the RI/FS, to present the proposed remedial alternatives for the site and solicit public comment on NYSDEC's chosen remedial alternative. Questions and answers recorded during this meeting are used to develop the Responsiveness Summary, presented in Appendix B of this document.

VII. ENFORCEMENT STATUS

Contamination at this site is the result of operations between 1908 and 1949 of the Kerry Chemical Company (a.k.a. the Thomas Keery Chemical Company.) Investigation carried out by NYSDEC's Division of Environmental Enforcement failed to uncover any living owner or operator related to the Kerry Chemical Company, or any subsequent owner of the property, capable of funding the site's remediation.

VIII. SUMMARY OF THE STATE DECISION

The chosen remedial alternative outlined in this document will provide a permanent solution to the contamination problems at this site. The removal of the wood tar waste from the flood plain and banks of the Cadosia Creek will eliminate the continuous slow flowing of the waste into the trout waters of the Cadosia Creek, and eliminates the possibility of another catastrophic release to the creek. Also eliminated with the excavation and destruction of the tar lagoons and tar flows on-site, is the long term source of air contaminant emissions and the physical entrapment hazard to wildlife and others that the exposed tar pits pose.

Thermal destruction of the wood tar using rotary kiln or CBC incineration provides permanent elimination of the waste from the environment. Design of an incineration system which has been proven highly effective for identical waste elsewhere, fitted with all the necessary air pollution controls, will result in safe, clean and efficient destruction of the waste. Conducting this thermal destruction on-site will accomplish the objectives above at a savings of millions of dollars over off-site incineration.

The remedial program as carried out thus far for the Kerry Chemical Company Site, and the chosen remedy outlined in this document, comply with Article 27, Title 13 of the New York State Environmental Conservation Law, and with Public Law 96-510 and Public Law 99-489, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments Reauthorization Act of 1986 (SARA), respectively. These laws provide the legal basis for the New York State hazardous site remedial program.

APPENDIX A

List of Documents in the Administrative Record

1. "Technical Proposal to Conduct a Remedial Investigation/Feasibility for the Kerry Chemical Company Site, Delaware County, New York," GHR Engineering - November 1985
2. "Phase II Engineering Investigation of the Kerry Chemical Company Site, Delaware County, New York," Wehran Engineering - July 1986
3. "Feasibility Study Report, Westline Site, Westline, Pennsylvania," NUS Corporation (for U.S. Environmental Protection Agency) - July 1986
4. "Contract Document for a Remedial Investigation/Feasibility Study at the Kerry Chemical Company Site," New York State Department of Environmental Conservation - July 1986
5. "Interim Investigative Work Plan, Site Safety Plan and Quality Assurance/Quality Control Plan for the Kerry Chemical Company Site," GHR Engineering - August 1986
6. "Final Investigative Work Plan, Site Safety Plan and Quality Assurance/Quality Control Plan for the Kerry Chemical Company Site," GHR Engineering - October 1986
7. "Supplemental Agreement to the Remedial Investigation/Feasibility Study Contract for the Kerry Chemical Company Site," New York State Department of Environmental Conservation - February 1987
8. "Raw Data Package from the Remedial Investigation for the Kerry Chemical Company Site," Compuchem - March 1987
9. "Draft Remedial Investigation Report for the Kerry Chemical Company Site, Volumes I and II," GHR Engineering - April 1987
10. "Final Remedial Investigation Report for the Kerry Chemical Company Site, Volumes I and II," GHR Engineering - June 1987
11. "Draft Feasibility Study Report for the Kerry Chemical Company Site," GHR Engineering - November 1987
12. "Final Feasibility Study Report for the Kerry Chemical Company Site," GHR Engineering - May 1988
13. "Citizen Participation Plan, Kerry Chemical Site," New York State Department of Environmental Conservation - April 1989
14. "Report on Post Feasibility Study Tasks, Kerry Chemical Company Site," GHR Engineering - July 1989

15. "Proposed Plan for the Remediation of the Kerry Chemical Company Site," New York State Department of Environmental Conservation - July 1990
16. "Public Meeting for the Kerry Chemical Company Site Remedial Investigation/Feasibility Study and Proposed Remedial Action Plan," Transcript Prepared by Czenenda Court Reporting, - August 1990

APPENDIX B

RESPONSIVENESS SUMMARY

The New York State Department of Environmental Conservation (NYSDEC) held a public meeting on July 19, 1990 in Hancock Central Schools' Auditorium to discuss the findings of the Kerry Chemical Company site Remedial Investigation/Feasibility Study (RI/FS) and the Proposed Remedial Action Plan. The studies were performed by GHR Engineering Associates under contract to NYSDEC. A list of those in attendance at the meeting is found at the end of the Responsiveness Summary.

The RI/FS documents were available for public review since April 1989 at the following locations:

- * Read Library, Hancock, New York
- * Hancock Town Hall, Hancock, New York
- * NYSDEC Region 4 Sub-office, Stamford, New York
- * NYSDEC Central Office, Albany, New York

Summary of Public Concerns and NYSDEC Responses

The following is a list of the questions asked during the public meeting, and NYSDEC's responses to those questions.

Q1. What do you do with the residue after incineration?

A. Since we have not yet conducted a trial burn of the Kerry wood tar waste, we do not know yet what the exact composition of the resulting ash will be. Trial burns to determine ash composition and stack gas content will be conducted during the upcoming Design phase of the project. From data already collected on the composition of the tar, however, it is possible to say two general things about the ash. First, because of the high organic, low inorganic content of the tar, the volume reduction due to incineration will be great; a relatively small amount of ash will be generated. Secondly, the inorganic analysis of the tar shows very low levels of the metals which would be of greatest concern: mercury (not detected in tar), lead (5.7 parts per million), cadmium (not detected), chromium (not detected), and zinc (5.4 ppm.) These low concentrations make it more likely that the heavy metal content of ash will be in a range that may easily be dealt with.

Once trial burns have generated ash from incineration of the Kerry tar, the ash will be analyzed. Based on these results, specifically the Toxicity Characteristic Leaching Procedure (TCLP) analysis and based on regulatory definitions, a determination will be made as to whether the ash will be designated hazardous. If the ash is hazardous, it will be disposed in a double-composite liner landfill. This could be done on-site in a small landfill cell that would be located above

the flood plain of the Cadosia Creek. There are areas on-site 25 feet above the creek grade which could be used. If hazardous, the ash could also be transported off-site to a secure hazardous waste disposal facility. The decision for on-site or off-site hazardous disposal could be based on a cost analysis of the two methods. If the volume of ash generated is small, off-site disposal may be the least expensive choice.

If the ash is designated non-hazardous, its disposal would again be carried out in the least expensive manner, on-site or off-site. With the ash non-hazardous, either method would be fairly inexpensive and subject to less regulatory restrictions.

- Q2. How can you guarantee the scrubbing process will be sufficient to remove any toxic materials going up the stack and how can you guarantee that activated charcoal will remove anything in the scrubber water?
- A. It had been stated previously in the public meeting that one method of air pollution control for rotary kiln incineration involves use of a wet scrubber on gasses leaving the afterburner, followed by activated carbon treatment of the scrubber water. This is the most commonly used combination of treatment technologies for air pollution control (APC) on rotary kiln incinerators. The air pollution controls for incineration of the Kerry Chemical Company waste will be custom-designed to the products of combustion which result from trial burns of the waste. Design of an appropriate air pollution control system, followed by detailed analysis of the resulting stack gasses to determine the efficiency of the APC system, will ensure that operation of the incineration meets all regulatory requirements for quality of air emissions. Similarly, if a wet scrubber or other APC technology that generates waste water is used, a waste water treatment system will be designed and operated to ensure that all regulatory requirements are met before any water is discharged.
- Q3. Is there any chance that the mobile incinerator proposed would be replaced by a permanent installation?
- A. No. The incinerator would be set up at the Kerry Chemical Company Site only to destroy the waste present on the Kerry Site and will be disassembled and taken away once the Kerry waste is gone. The entire operation, once begun, will take less than one year.
- Q4. Can the owner of this property use it for something else once this project is complete?
- A. Yes. The property owner was determined to have insufficient funds to pay for the study or cleanup of the Kerry Chemical Site, so the State of New York is not attempting to recover costs from him. The land will remain his at the completion of this project,

although NYSDEC's Division of Fish and Wildlife has proposed requesting that he agree to an access easement so that public access to the Cadosia Creek for fishing could be provided. One other change in the property would take place. The decrepit buildings and concrete stack still standing on site would be destroyed to remove the hazard they pose in the event of their failure during on-site work.

Q5. Is the tar carcinogenic?

Of the hundreds of chemical compounds contained in the Kerry Chemical tar, six were identified that are considered suspected carcinogens. All six fall within the category of polycyclic aromatic hydrocarbons (PAH's). Therefore, the tar can be said to be carcinogenic. The route by which humans are most likely exposed to the carcinogens was determined in the Remedial Investigation to be ingestion of fish which have absorbed the PAH compounds from sediments in the Cadosia Creek. No other route of exposure is likely expect direct contact through entrapment in a tar lagoon since the PAH's do not significantly volatilize into the air, nor have they dissolved into surface water or groundwater.

There were no written questions or comments received during the 30 day comment period following the public meeting, nor since.

KERRY CHEMICAL COMPANY SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Public Meeting

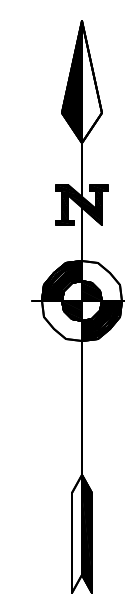
Hancock Central Schools Auditorium

July 19, 1990

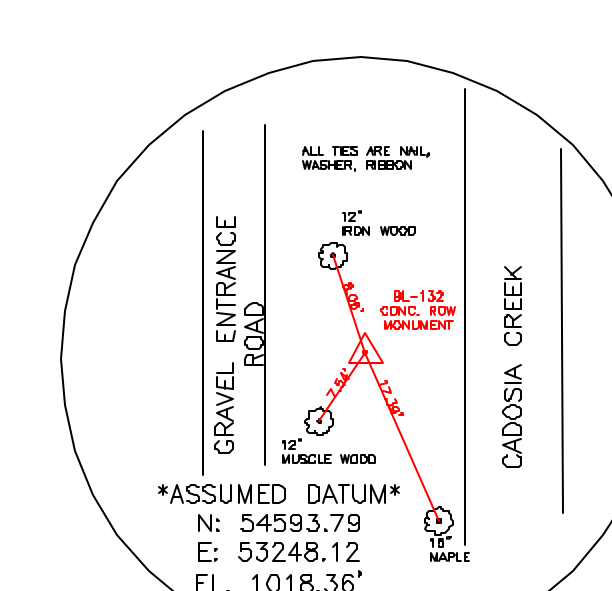
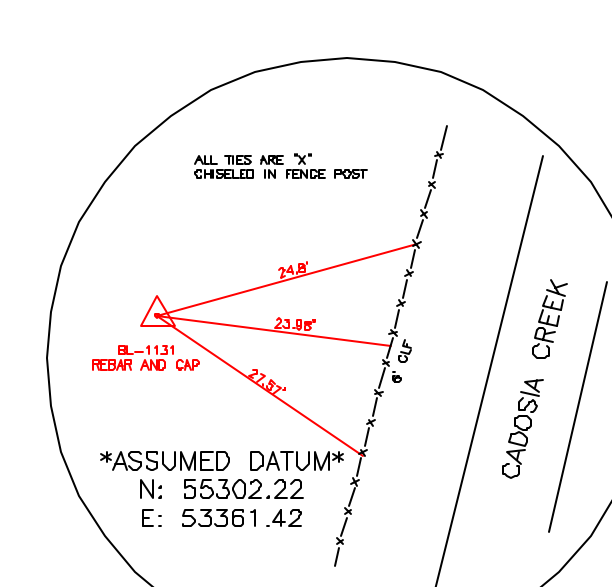
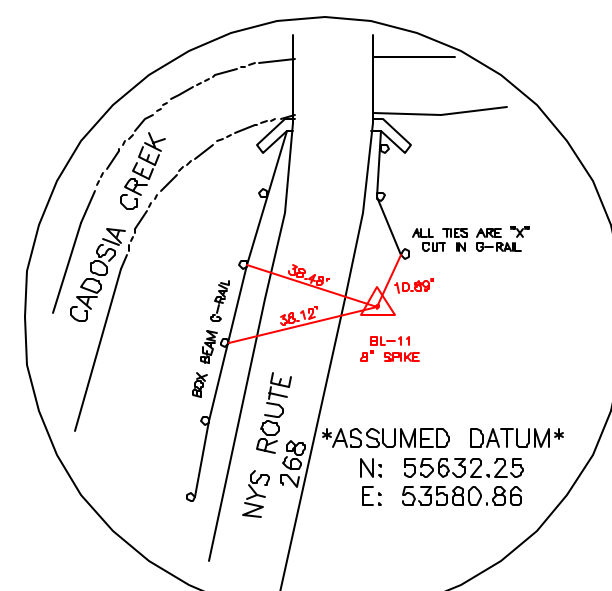
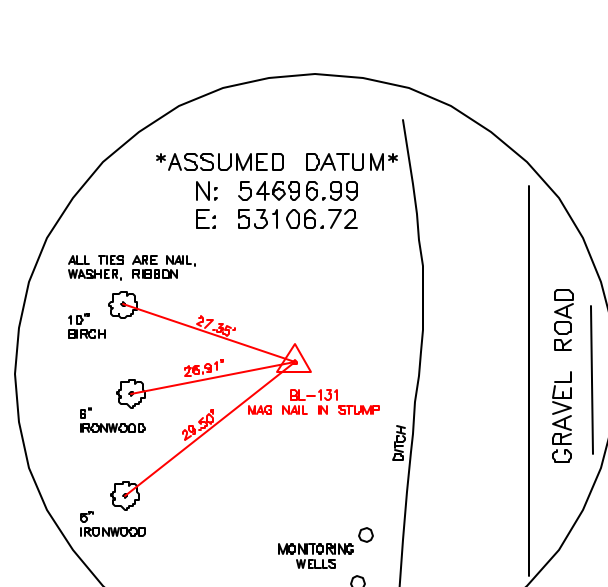
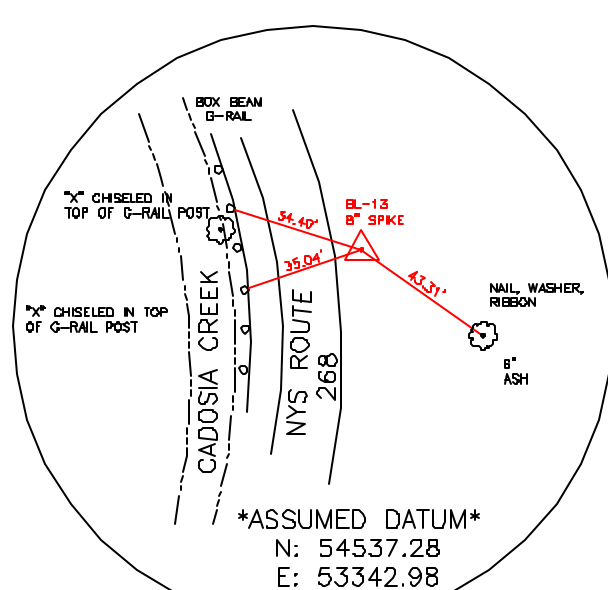
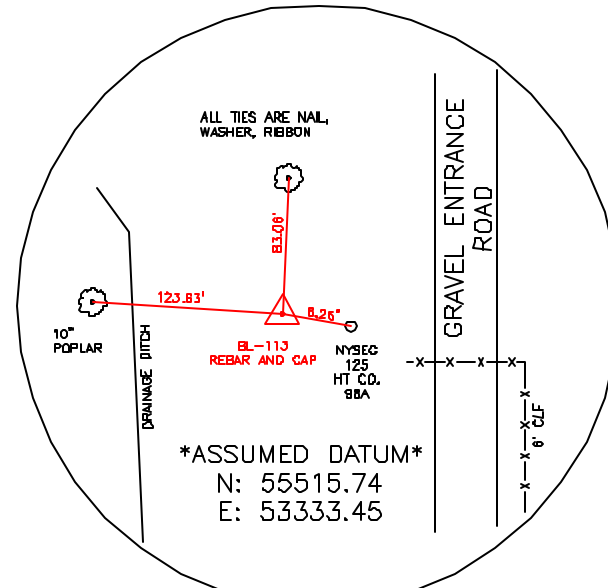
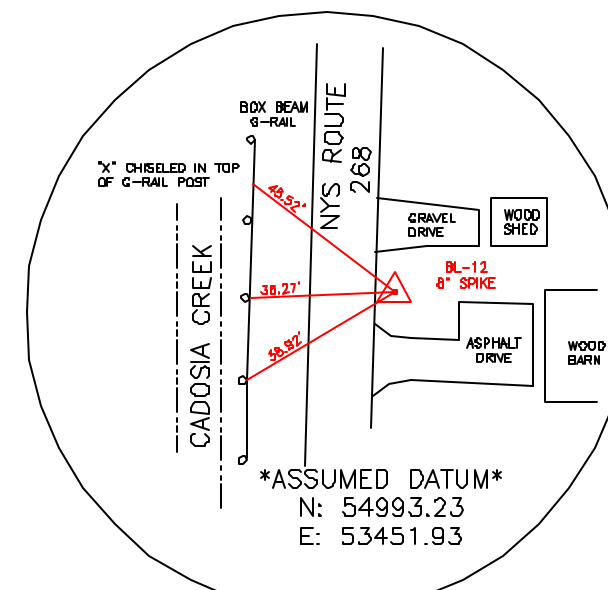
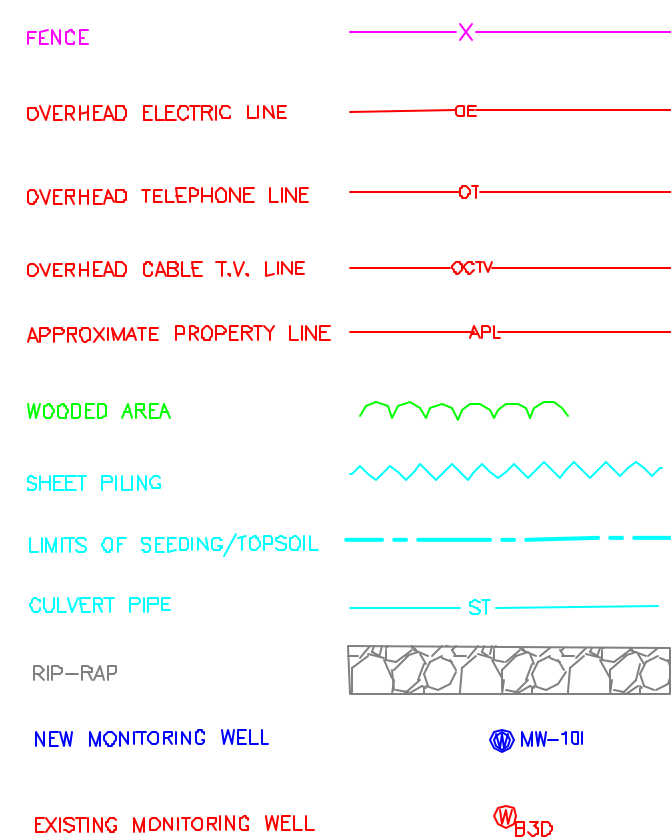
7:00 PM

Karan Vetrone	Hancock Resident
Patty Vetrone	Hancock Resident
Harold Swartwout	Hancock Resident
Shaun Goethardt	Hancock Resident
Ed Pavilonis	Hancock Resident
John Evanitsky, Jr.	Property Owner
Ralph Hunter	Cadosia Resident
Mary Ann Hunter	Cadosia Resident
Leonard E. Sienko, Jr.	Hancock Resident
Edward Juba	Hancock Resident
Alan Ramburg	Cadosia Resident
Karen Ramburg	Cadosia Resident
Mike Ramburg	Cadosia Resident
Mrs. Raymond Swartwout	Cadosia Resident
John R. Price	Cadosia Resident
Mrs. John Price	Cadosia Resident
Robert Newman	Hancock Resident
Oliver D. Hewitt	Hancock Resident
Chris Jones	Press, Walton
Sally Zegers	Press, Hancock
Scott Foti	NYSDEC, Central Office
Bob Edwards	NYSDEC, C.O.
Darwin Roosa	NYSDEC, Region 4
Eric Hamilton	NYSDEC, Region 4
Ray Lupe	NYSDEC, C.O.
Russ Shaver	NYSDEC, Region 4

APPENDIX F AS BUILTS



LEGEND



MONITORING WELLS					
WELL NUMBER	NORTHING	EASTING	TOP OF INNER CASING	TOP OF OUTER CASING	GROUND ELEVATION
MW-10S	55543.03	53382.73	1036.53		1033.35
MW-10I	55557.15	53382.80	1039.26		1033.43
MW-100	55556.16	53377.23	1038.48		1033.39
MW-9S	55571.63	53296.19	1035.44		1033.54
MW-7S	54862.24	53312.72	1024.78		1022.02
MW-7I	54877.28	53315.92	1024.69		1022.80
MW-5S	54862.80	53262.24	1022.50		1020.49
MW-5I	54860.88	53265.58	1021.57		1020.05
MW-30	54899.89	53271.20	1022.02		1020.43
MW-4S	54458.64	53148.08	1018.21		1017.29
MW-4I	54467.65	53154.20	1018.91		1017.90
MW-2S	54239.31	52979.23	1018.27		1012.61
MW-3I	54225.66	52973.02	1015.97		1011.19
MW-11S	55227.76	53090.37		1047.79	1044.28
MW-B1D	55226.21	53095.30		1048.09	1044.66
MW-B3S	54451.45	53130.25		1023.96	1021.05
MW-B3D	54447.61	53140.78		1023.87	1021.05

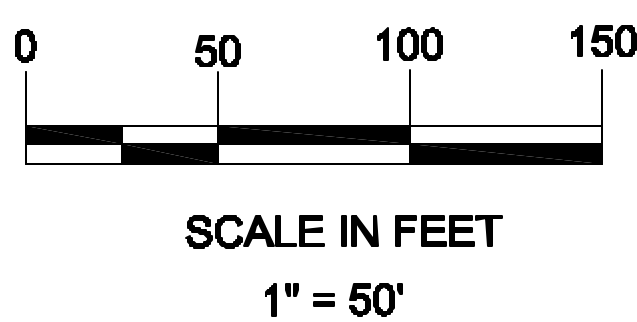
NOTE

- DATUM REFERENCED TO "KERRY CHEMICAL COMPANY SITE" DRAWINGS EC-1 AND EC-2 DATED MARCH 28, 1997 AND REVISED APRIL 17, 2001.
- MAP REFERENCE:
 - LANDS OF CHASE S. VITALE, JR. AND JAMES F. VITALE SURVEYED BY DAVID J. BEERS AUGUST 1, 1991.
 - KERRY CHEMICAL INACTIVE HAZARDOUS WASTE DISPOSAL SITE SURVEYED BY CLARENCE T. O'BRIEN JANUARY 7, 1985 MAP #10393.

CERTIFICATION:
WE, SHUMAKER CONSULTING ENGINEERING AND LAND SURVEYING, P.C., CERTIFY THAT THE TOPOGRAPIHICAL CONDITIONS THAT ARE SHOWN ON THIS MAP WERE PREPARED FROM THE NOTES OF AN INSTRUMENT SURVEY COMPLETED ON NOVEMBER 9, 2007. THE APPROXIMATE BOUNDARY LINES INDICATED ON THIS MAP HAVE BEEN SHOWN FROM THE INDICATED MAP REFERENCES. THE MISTERY BOUNDARY LINE WAS DETERMINED WITHOUT THE BENEFIT OF AN ABSTRACT OF TITLE.

DATE: JANUARY 3, 2008

AMMON A. BUSH, LAND SURVEYOR
P.L.S. LICENSE NO. 050344



FORMER
KERRY CHEMICAL SITE
AS BUILT SURVEY

TOWN OF HANCOCK, DELAWARE COUNTY
NEW YORK STATE
NOVEMBER 2007

SHUMAKER
CONSULTING ENGINEERING & LAND SURVEYING P.C.

143 Court Street
Binghamton, New York 13901

APPENDIX G EXCAVATION WORK PLAN (EWP)

G-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the Site's cover system, the Site owner or their representative will notify the NYSDEC contacts listed in the table below. Table G-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix C.

Table G-1: Notifications*

Jasmine Stefansky, NYSDEC Project Manager	518-402-9575; jasmine.stefansky@dec.ny.gov
Jeffrey Dyber, NYSDEC Project Manager's Supervisor	518-402-9698; jeffrey.dyber@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	518-402-9569; kelly.lewandowski@dec.ny.gov
Kristin Kulow, NYSDOH Project Manager	607-353-4335; kristin.kulow@health.ny.gov
Arunesh Ghosh, NYSDOH Project Manager	518-402-7860; arunesh.ghosh@health.ny.gov
Joshua Oliver, EA Project Manager	315-857-5793; joliver@eaest.com

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

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for Site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, 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, and submittals (e.g., reports) to the NYSDEC documenting the completed 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 the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EQP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

G-2 SOIL SCREENING METHODS

Visual, olfactory, and instrument-based (e.g., photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination). 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 will perform the screening. 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 below.

G-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.

G-4 MATERIALS EXCAVATION AND LOAD-OUT

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 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. A Site utility stakeout will be completed for all utilities prior to any ground intrusive activities at 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). Trucks transporting contaminated soil must have either tight fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

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. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

G-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 either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are

locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

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

Trucks will be prohibited from stopping and idling near residences 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.

G-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 off-site in a permitted facility in accordance with all local, State 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 project manager. Unregulated off-site management of materials from this Site will not occur without formal NYSDEC project manager 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, (e.g., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility) Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: 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 consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

G-7 MATERIALS REUSE ON-SITE

The qualified environmental professional, as defined in 6 NYCRR Part 375, will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e., contaminated) 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 later or impervious surface, and will not be reused within the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the Site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (April 2023 or date of current version, whichever is later) guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described above. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of Site excavation activities and proximity to nearby Site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

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.

G-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 off-site at a permitted facility 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.

G-9 COVER SYSTEM RESTORATION

There is currently no cover system in place at the Site. If a cover system is implemented in the future, this section will be revised accordingly.

G-10 BACKFILL FROM OFF-SITE SOURCES

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for commercial or industrial use. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. 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.

G-11 STORMWATER POLLUTION PREVENTION

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

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

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

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

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

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

G-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. The NYSDEC project manager will be promptly notified of the discovery.

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 (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the Site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone within two hours 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.

G-13 COMMUNITY AIR MONITORING PLAN

Appendix H of the SMP includes a Community Air Monitoring Plan that should be implemented for any future excavation work at the Site. Air monitoring locations shall be placed upwind and downwind of the site, and 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.

G-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include the use of odor-control foam, bioSolve (or approved equal), or other methods approved by NYSDEC. 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.

G-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the CAMP provided in Appendix H, and in accordance with Appendix 1A of DER-10, Generic Community Air Monitoring Plan. If particulate levels at the Site exceed the thresholds listed in the CAMP or if airborne dust is observed on the Site or leaving the Site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the Site.

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 using 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.

APPENDIX H HEALTH AND SAFETY PLAN AND CAMP

The Health and Safety Plan (HASP) is included herein following the Community Air Monitoring Plan below.

COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for volatile organic compounds will be conducted at the perimeter of the

Exclusion Zone during the intrusive activities as follows:

- Volatile organic compounds and dust particulates will be monitored at the downwind perimeter of the exclusion zone on a continuous basis. If total organic vapor levels exceed 5 parts per million (ppm) above background, work activities will be halted, and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review if requested.
- If particulate levels at the downwind station exceed particulate levels at the upwind station by more than 100 micrograms per cubic meter (mcg/m^3), work activities will be halted, and appropriate dust suppression measures will be employed. All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review if requested.

Vapor Emission Response Plan

If the ambient air concentration of total organic vapors at the downwind perimeter of the Work Area or Exclusion Zone exceed 5 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 will resume with continued monitoring. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the Exclusion Zone, activities can resume provided the organic vapor level 200 feet downwind of the Exclusion Zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 10 ppm at the perimeter of the Exclusion Zone, activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the Site HSO will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan.

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

Major Vapor Emission Response Plan

If any organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, whichever is less, all work activities will be halted.

If, following the cessation of work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, then the air

quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20-foot zone).

If efforts to abate the emission source are unsuccessful and organic vapor levels approaching 5 ppm persist for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect. Also, the Major Vapor Emission Response Plan shall be immediately placed into effect if 20-foot zone organic vapor levels are greater than 10 ppm above background.

Upon activation of the Major Vapor Emission Response Plan, the following activities will be undertaken:

- All Emergency Response authorities will immediately be contacted by the Site HSO and advised of the situation.
- Air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site HSO.

Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will 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 will be equipped with an audible alarm to indicate exceedances of the action level. In addition, fugitive dust migration will be visually assessed during all work activities.

If the downwind PM-10 particulate is 100 mcg/m³ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that either of the downwind stations report PM-10 particulate levels do not exceed 150 mcg/m³ above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m³ above the upwind level, work will be stopped, and a re-evaluation of activities initiated. Work will resume if dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m³ above the upwind level and preventing visible dust migration.

All readings will be recorded and available for NYSDEC and NYSDOH personnel to review.



Department of Environmental Conservation

SITE MANAGEMENT

HEALTH AND SAFETY PLAN

WORK ASSIGNMENT D009803-38

KERRY CHEMICAL COMPANY SITE NO. 413001
APEX CADOSIA ROAD
HANCOCK/DELAWARE COUNTY, NY

Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway, Albany, New York

Basil Seggos, Commissioner

DIVISION OF ENVIRONMENTAL REMEDIATION
Remedial Bureau B

AECOM USA, Inc.
257 West Genesee Street
Suite 400
Buffalo, New York 14202

FINAL
April 2021

Universal Health and Safety Plan

For use on all high-risk, industrial and HAZWOPER projects
Includes control measures for the Coronavirus Pandemic



Kerry Chemical Company

Apex Cadosia Road
Hancock, NY 13783
U.S.A.

Latitude: 41.9880827, Longitude: -75.26491824

60650103

Site Management

Prepared for

NYSDEC

625 Broadway
Albany, NY 12233
U.S.A.

Prepared by

AECOM

257 W. Genesee St., STE 400
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U.S.A.

Prepared By:

Kevin J. McGovern, PG, CHMM
Sr. Environmental Scientist

Signature

4/29/2021

Date Prepared

Reviewed By:

Dale "Pete" Wray, CSP, CHMM, STS
Safety, Health & Environment
Manager

Signature

4/29/2021

Date Reviewed

Approved By:

Rob Murphy, PG
Project Manager

Signature

4/29/2021

Date Approved

Expiration: **4/29/2022**

Valid for one (1) year maximum or until the scope of work, subcontractor(s), methods and/or equipment change.

HASP SUMMARY

Note: This Summary is intended to provide key information only and cannot be substituted for reading, understanding, and complying with the full HASP, including the Emergency response section. This summary may be continually updated as tasks and personnel change. Use Continuation Sheets if necessary.

Project Name:	Kerry Chemical Company, Site Management	Project Number:	60650103
Client Name:	NYSDEC		
SH&E INCIDENT REPORTING			
DCS Americas Incident Hotline 1-800-348-5046 TOLL-FREE 24 HOURS PER DAY 7 DAYS PER WEEK			
Immediately report injuries, illnesses, property damage, security issues, regulatory inspections, environmental impacts/spills, and any potentially work-related injury, illness, discomfort/pain or damage.			
MEDICAL TREATMENT RESOURCES			
Identify the nearest Occupational Clinic and Hospital to the site that accepts AECOM Workers Compensation Insurance (see Attachment A for instructions). If the they are an unreasonable distance from the site, identify nearer hospitals or clinics. Attach maps and directions to the clinics and hospitals in Attachment A .			
AECOM Occupational Nurse			
1-512-419-5016 24 HOURS PER DAY 7 DAYS PER WEEK			
Nearest Occupational Clinic			
Name:	WellNow Urgent Care	Phone Number:	(607) 376-5346
Address:	5001 NY-23, Oneonta, NY 13820		
Hours of Operation:	8AM-8PM		
Nearest Hospital			
Name:	UHS Delaware Valley Hospital	Phone Number:	(607) 865-2100
Address:	1 Titus Pl, Walton, NY 13856		
KEY PERSONNEL			
Project Manager (PM):	Robert J. Murphy, PG	Contact No.:	(716) 903-1346
Site Supervisor (SS):	TBD	Contact No.:	TBD
Safety Officer (SSO):	TBD	Contact No.:	TBD
Regional SH&E Manager	Candice Johnson (Environment)	Contact No.:	416-407-9661
Area SH&E Manager:	Pete Wray (EBL EH&S East/REM-IAP NE)	Contact No.:	302-660-9178
Client PM:	Charles Gregory	Contact No.:	(518) 402-8246
NOTES: D – Direct Office Number O – General Office Number M – Mobile Device Number R – Radio Channel			

Short Service Employees (AECOM and Subcontractors) < 6 months with Company in Current Job Description		☐ Yes, see table below for details ☒ None, not applicable	
Name	Company	Mentor	Mentor's Phone Number

NOTES: D – Direct Office Number O – General Office Number M – Mobile Device Number R – Radio Channel

Subcontractors (List All)		☐ Yes, see table below for details ☒ None, not applicable	
Company Name	Task(s)	Site Safety Officer	SSO's Phone Number

NOTES: D – Direct Office Number O – General Office Number M – Mobile Device Number R – Radio Channel

PM must positively verify subcontractors are approved in Subport (or by an equivalent evaluation process) for the work described. If there were any limitations/ conditions of approval, describe them below and how they are being met including the following (where applicable):

☐ Copy of their Corporate Safety Management Manual
☐ Copy of their Project/Site-specific health and safety plan
☐ Copy of task specific THAs/JHAs and daily inspection/tailgate forms
☐ Copy of their Pre-Qualification form
☐ Copy of their latest Workers Compensation Board (WCB) documents
☐ Copy of the signed contract
☐ Copy of their business license and training certificates (task specific)
☐ Other (Describe)
☐ I have verified that all subcontractors are approved in Subport (or equivalent), and that all conditions of approval are met.
Project Manager Name Project Manager Signature Date

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Attachment A:	Hospital/Clinic Maps and Incident Reporting Flow Chart
Attachment B:	THA Forms, and Tailgate Safety Meeting Form
Attachment C:	AECOM SHE Procedures
Attachment D:	Stretch/Flex Poster
Attachment E:	Site Orientation
Attachment F:	Safety Data Sheets

REVISION LOG

Template Revisions			
Version	Revised By	Date	Details of Revision
1.0	Alberto Munuera, Patrick Walz, & Gregg Ferris	14 FEB 2020	Initial Version, merging and replacing previous template documents (HAZWOPER HASP and Industrial/Project HASP)
1.1	Patrick Walz & Alberto Munuera	26 MAR 2020	Modified to add Coronavirus prevention and response guidelines
1.2	Tim Gilles, Kelly Dwyer, Scott Dietz, Lisa Rygiel, & Maria Hunt	28 MAY 2020	Formatting and grammar correction. Customized for universal use on high risk, Industrial and HAZWOPER projects

Project-Specific Revisions			
Version	Revised By	Date	Details of Revision
0	KJM	4/30/21	None – Original Site Health and Safety Plan
1			
2			
3			
4			

1. INTRODUCTION

This written Health and Safety Plan (HASP) is designed to identify, evaluate, and control safety and health hazards, and to outline emergency response actions for AECOM-managed activities. This HASP must be kept on site during work activities and made available to all workers including subcontractors and other site occupants for informational purposes. AECOM subcontractors are expected to independently characterize, assess, and control site hazards created by their specific scope of work.

This section of the HASP summarizes important AECOM SH&E Procedures that apply to all Design and Consulting Services (DCS) Americas jobs. See **Attachment B** for the Project Task Hazard Assessment (THA) forms and **Attachment C** for complete copies of applicable field SH&E Procedures.

1.1 Applicable References

This HASP conforms to the regulatory requirements and guidelines established in the following documents:

- Federal Occupational Safety and Health Administration (OSHA) Code of Federal Regulation Title 29, Part 1910 (29 CFR Part 1910), Safety and Health Regulations for General Industry and 29 CFR 1926, Safety and Health Regulations for Construction.
- National Institute for Occupational Safety and Health/Occupational Safety and Hazards Administration/U.S. Coast Guard/U.S. Environmental Protection Agency, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.
- The requirements in this HASP also conform to AECOM's Safety for Life Program requirements as specified in the AECOM Safety, Health and Environment (SH&E) Manual.
- New York State Department of Environmental Conservation (NYSDEC). 1990. Record of Decision, Kerry Chemical Company Site, Delaware County, New York, Site Number 4-13-001. December.
- URS Corporation – New York (URS). 2008. Kerry Chemical Operation, Monitoring and Maintenance (OM&M) Plan. January.

1.2 Project Assumptions

- This site is an AECOM-controlled site.
- Site management will assist in locating subsurface utilities, vessels, and structures located on the property and outside the scope of the utility locator service.
- No confined spaces will be entered on this project.
- No excavations will be entered.
- No work at heights (with fall protection) will be performed
- Work will be performed during daylight hours.

2. SITE DESCRIPTION

The Kerry Chemical Company Site (Site) is 10-acre site located in a rural area. The Site is approximately 1.3 miles north of the hamlet of Cadosia in the Town of Hancock, Delaware County and is bounded on the east by the Cadosia Creek and on the west by an abandoned railroad grade and steep hillside (See Figure 2-1). The Site is relatively flat, heavily vegetated, and is surrounded by steep hills and glacial valleys, defined as part of the Appalachian Plateau. There are no buildings on the Site. The adjacent Cadosia Creek flows into the East Branch Delaware River two miles downstream of the Kerry Site. The Site is currently inactive. There is no zoning in the hamlet of Cadosia; however, all buildings must undergo planning board approval. The Site is a sparsely populated rural area with fewer than 10 residences within a one-half mile radius of the Site.

2.1 Site Background/History

The Kerry Chemical Company operated at this site from 1908 to 1949. The original intent of the plant operation was to utilize local hardwood trees to produce charcoal through a pyrolysis process. As chemical technology advanced, the process was improved to collect gasses liberated from the wood during heating. Condensing and distilling these gasses resulted in the production of methanol, methyl acetate, acetic acid, formaldehyde, and acetone. The waste products of this process consisted of black or brownish tar-like substances which were pumped while hot to one of three on-site lagoons or directly into the Cadosia Creek. The tar waste remained in five on-site lagoons ranging from 3-10 feet in depth. The waste was also seen in areas where it is flowing slowly overland as a thin surface layer. The waste had a viscous tar-like consistency which is almost solid in cold weather but decreases in viscosity and behaves more like a liquid in warm weather. Where exposed to air, the tar-waste emits a creosote odor. The intensity of odor emission is also temperature dependent (i.e. strongest in warm weather). In 1965, while a contractor for the NYS Department of Transportation (NYSDOT) was working to realign the Cadosia Creek adjacent to the Kerry Chemical Site during a highway project, a backhoe operator excavating along the creek's west bank inadvertently penetrated a tar lagoon. The large volume of tar that was released to the creek resulted in a major fish kill in both the Cadosia Creek and 2 miles downstream in the East Branch Delaware River. A ten foot high, 70 foot long sheet pile retaining wall was installed afterward by NYSDOT and remains in-place to support the creek bank and hold back the buried tar lagoon. Tar from on-site had also been released slowly to the creek over a period of several years through an old buried culvert. The culvert was plugged to prevent further discharge to the creek in 1986. The culvert was permanently cut off in the Summer of 1989. At the far southern end of the Site, the leading edge of the tar flowing overland had reached Cadosia Creek.

A Remedial Investigation/Feasibility Study (RI/FS) was completed at the Kerry Chemical site in the late 1980's. A Record of Decision (ROD) was signed in December 1990 calling for on-site thermal destruction of the wood tar wastes. A Remedial Design (RD) was completed in 1995, which complied with the ROD. Subsequently, off-site disposal was re-evaluated and incorporated into an Explanation of Significant Difference (ESD) and included in the bid documents as an alternate method of disposal. The initial construction contract implementing off-site disposal began in late 2005 and early 2006. Extensive quantities of tar were encountered beyond the amount anticipated in the initial construction contract. A second ESD was issued and a second construction contract was advertised in August 2006 to finish the work. The second phase of work was completed in 2007.

2.2 Client and/or Third-Party Operations at Site

There are no Client or third party operations at the Site.

2.3 Scope of Work

2.3.1 Project Scope and Objective(s)

The scope is post-remediation monitoring and maintenance activities at the Kerry Chemical Site to comply with URS' OM&M Plan (See Section 1.1).

A biennial Site inspection will be performed starting in 2021 and will include an inspection of monitoring wells, roads, vegetative cover, stream bank protection, and fencing. In order to conserve budget, the Site inspection will be performed in conjunction with groundwater monitoring.

Groundwater samples will be collected from 15 existing monitoring wells plus quality assurance/quality control (QA/QC) samples. Groundwater samples will be collected in accordance with low-flow groundwater sampling procedures, with the exception of locations MW-B1S and MW-B1D which will be purged to dryness and sampled after recovery using dedicated bailers.

Groundwater elevation measurements will be conducted at each well with each groundwater-sampling event.

During the last Site visit wells MW-03I and MW- 03S were observed to be undercut and damaged by Cadosia Creek. During the 2021 inspection AECOM will manually decommission these two wells in place by pumping grout via a tremie tube to the bottom of each well, and the risers and protective casings (if present) will be removed/cut at grade level. Well decommissioning will be completed in general accordance with NYSDEC's CP-43 Groundwater Monitoring Well Decommissioning Policy. Decommissioning activities will only take place if it is safe to do so based on creek levels and footing at the time of the inspection.

2.3.2 Risk Register

The following tasks will be performed to achieve the project objective(s). A Task Hazard Assessment (THA) for each operation being performed by AECOM must be included in **Appendix B**, while those performed by the managed subcontractors must be prepared by the subcontractor. Oversight of managed subcontractor activities is considered a discrete AECOM task and shall also be listed below.

Task Name	Permit(s) Required		Task Performed By		
			AECOM	SUB	Third-Party
<u>Coronavirus Precautions THA</u>	☐ Yes	☒ No	☒	☐	☐
Site Inspection	☐ Yes	☒ No	☒	☐	☐
Low-Flow Groundwater Sampling	☐ Yes	☒ No	☒	☐	☐
Groundwater Sampling Via Bailer	☐ Yes	☒ No	☒	☐	☐
Well Decommissioning/Grouting	☐ Yes	☒ No	☒	☐	☐
Driving to and from sites	☐ Yes	☒ No	☒	☐	☐

Task Name	Permit(s) Required		Task Performed By		
			AECOM	SUB	Third-Party
	☐ Yes	☐ No	☐	☐	☐
	☐ Yes	☐ No	☐	☐	☐

2.3.3 Scope of Work Risk Assessment

☒ Low Risk	Examples: Non-intrusive work, occasional exposure and/or low risk hazards
☐ Medium Risk	Examples: Intrusive work, heavy equipment use, frequent exposure and/or moderate hazards
☐ High Risk	Examples: Complicated scope, large/multiple work crews, and/or constant exposure to hazards

In general, the following tasks are considered High Potential (HiPo), as identified in S3AM-209-PR, Risk Assessment, based on the factors contributing to the severity and probability of credible outcomes resulting from ineffective mitigation of their hazards. Additional tasks or activities could be added to the list below based on a similar assessment their hazards and associate control measures. The following HiPo tasks will be required to complete the approved scope of work.

☐ Working at heights > 4 ft (including aerial lifts, snooper trucks, scaffolds)	☐ Working in a controlled area
☐ Working in a confined space	☒ Extreme heat or cold stress environments
☐ Working in a trench or excavation	☐ Working with power tools/equipment (drill, chain saw, grinder, etc.)
☐ Performing tasks requiring lock out/tag out	☐ Working with/operating heavy equipment or machinery, including drill rigs
☐ Work on energized equipment	☐ Working in isolation from first aid services or immediate/emergency assistance
☐ Working with electricity	☐ Working around mobile equipment
☒ Working with hazardous substances or materials (including all HAZWOPER projects)	☐ Exposure to vehicular traffic (highways, roads, parking lots)
☐ Working with material under pressure	☐ All-Terrain Vehicle Work
☐ Working where there is a possible threat of violence, including civil unrest	☐ Working on Railroads or within 25 Feet of Tracks
☐ Working in avalanche areas	☐ Any activity/task involving <u>non-voluntary</u> use of respiratory protection, including for site access
☐ Working on or over water or ice	☐ Working with people diagnosed with coronavirus or other pandemic diseases
☐ Working in remote or wilderness isolation	☐ Other HiPo Task(s) [specify]:

The following AECOM procedures provide task specific permit requirements and shall be consulted if applicable to the scope of work ([S3AM-218-PR](#)):

☐ S3AM-120-PR , Radiation	☐ S3AM-304-PR , Fall Protection
☒ S3AM-209-PR , Risk Assessment & Management	☐ S3AM-310-PR , Cranes & Lifting Devices
☐ S3AM-301-PR , Confined Spaces	☐ S3AM-325-PR , Lockout Tagout
☐ S3AM-302-PR , Electrical Safety	☐ S3AM-330-PR , Underground Work
☐ S3AM-303-PR , Excavation	☐ S3AM-332-PR , Hot Work

2.4 Cleaning/Disinfecting, Housekeeping and Personal Hygiene

During the Pandemic, AECOM has identified three basic levels of cleaning that are described in our [AECOM Pandemic Procedure](#). AECOM also requires that each location develop a Touch Point Cleaning program. Each project site shall implement a touch point cleaning program to minimize the transmission of the virus through environmental sources, specifically hard surfaces or "touch points." It is recommended that each site develop a checklist to identify the touch points specific to the Site. The checklist can be initialed, dated, and signed for each touch point item to document the cleaning process. This cleaning should be conducted daily or more often as needed/desired. Contract a service or designate a person(s) and/or develop a schedule for cleaning responsibilities. Common touch points are listed below:

- Light Switches
- Equipment controls
- Cabinet and file drawer knobs/handles.
- Vending machines
- Chair arms
- Copier/printer/fax control buttons
- Shared desks and keyboards
- Shared tools and equipment
- Garage access buttons
- Handrails
- Doorknobs/handles
- Elevator buttons
- Sinks and Faucets
- Counter tops
- Tabletops
- Coffee pots
- Refrigerator
- Microwave
- Water dispensers
- Windowsills
- Portable toilet commonly touched areas
- Personal protective equipment (PPE) items

Basic housekeeping requirements for offices and work sites, as well as personal hygiene and sanitation standards can be found in [S3AM-013-PR](#) Housekeeping. Inspections will be performed at the regular interval specified below. The housekeeping inspection form [S3AM-013-FM1](#) is available for use. Complete the table below regarding site-specific Housekeeping and Personal Hygiene requirements:

Cleaning/ Disinfecting	Frequency:	Daily
	Responsible Party:	SS/SSO or Designee
Housekeeping:	Inspection Frequency:	Daily
	Inspector:	SS/SSO or Designee
Eating, Drinking, Smoking:	Permitted only in designated area(s) located in the support zone.	

Handwashing:	Water, soap, and paper towels or equivalent supplies are located in restrooms in nearby restaurants/ convenient stores in town or provided by field staff. Site staff will wash hands and face after completing work activities and prior to breaks or meals.
Toilets:	Toilets are located in restrooms in nearby restaurants/ convenient stores in town. <i>NOTE: A minimum of one toilet must be provided for every 20 personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities, on-site facilities are NOT required.</i>
Water:	Water is located off site in neighboring gas stations, convenient stores, etc. A water supply meeting the following requirements will be used: <i>Potable Water:</i> An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Disposable drinking cups for single use and a waste receptacle will be provided as needed. Water containers will be refilled daily and disinfected regularly. Potable water containers will be properly identified in order to distinguish them from non-potable water sources. <i>Non-Potable Water:</i> Outlets for non-potable water shall be posted or otherwise marked in a manner that will indicate clearly that the water is unsafe and is NOT to be used for drinking, washing of the person, cooking, washing of food, washing of cooking or eating utensils, washing of food preparation or processing premises, or personal service rooms, or for washing clothes. Non-potable water is water that does not meet OSHA's Sanitation standard for potable water. All containers of non-potable water will be marked with a label stating "Non-Potable Water, Not Intended for Drinking Water Consumption"
Illumination:	Artificial illumination will <u>not</u> be provided. If natural light or installed lighting fixtures are not sufficient in the work area, toilet, and/or break area, then work activities will cease until adequate lighting is available.

3. AECOM SAFETY, HEALTH, AND ENVIRONMENT PROGRAM

3.1 AECOM Policy

AECOM's Safety, Health and Environment Policy, which establishes the framework to attain best-in-class Safety, Health and Environmental (SH&E) performance in the interest of benefitting AECOM's employees and stakeholder in the global marketplace, is available on AECOM's Ecosystem (intranet).

3.2 Safety for Life



"Safety for Life" is a comprehensive integrated AECOM Safety Management System that drives our nearly 100,000 employees toward AECOM's commitment to achieving zero work-related injuries and/or illnesses; preventing damage to property and the environment; and maintaining an environmentally friendly and sustainable workplace. Our Safety for Life program is supported by nine Life Preserving Principles that apply to all AECOM activities.

3.3 Life Preserving Principles

AECOM has adopted these "Life-Preserving Principles" to help demonstrate the commitment of our Safety for Life program. We firmly believe these "Life-Preserving Principles" will enable AECOM to achieve its goal of zero employee injuries, property damage and an environmentally friendly and sustainable workplace. The nine Life-Preserving Principles, along with their descriptions, can be found on AECOM's Ecosystem (intranet).

 Commitment: Managers will lead on safety, continuously demonstrating commitment to the highest standards.	 Recognition and Rewards: Employees are rewarded for safety excellence and we share best practices..
 Participation: All employees are encouraged to engage in helping to control the risks we face.	 Orientation and Training: Our employees will be provided with effective safety training in order to identify and mitigate hazards in the workplace to prevent injuries to themselves and others who may be affected by their actions.
 Budgeting and Staffing for Safety: The costs of managing SH&E are budgeted into every project. Our safety staff are fully trained to provide expert guidance.	 Incident Investigation: We investigate recordable incidents and serious near misses to understand the causes and take action to prevent recurrence.
 Pre-planning: We assess risks and produce detailed plans to control them during design, planning, and execution of work.	 Fit for Duty: All staff come to work each day fit and well, so they do not pose a hazard to themselves or others.
 Contractor Management: We carefully select and collaborate with all our partners to create a safe working environment.	

3.4 Driving and Vehicle Safety

The proper operation of vehicles is critical to protecting the safety of AECOM employees and subcontractors. Drivers face numerous hazards while operating vehicles. Some of the hazards include collision with another vehicle, collision with a fixed object, vehicle break down or failure, or falling asleep or becoming otherwise incapacitated while driving. All employees will adhere to Driving procedure [S3AM-005-PR](#), which includes the following key practices:

1. Authorized Drivers

Managers must authorize drivers following evaluation of driver criteria to drive and maintain an AECOM-owned, leased or rented vehicle, a client or customer-owned vehicle, or a personal vehicle operated in the course of conducting AECOM business.

2. Electronic Devices Prohibited

AECOM prohibits use of all portable electronic devices while operating a motor vehicle/equipment, which includes being stopped at a traffic light or stop sign. Electronic devices include, but are not limited to, all mobile phones, two-way radios, pagers, iPods, MP3s, GPS, DVD players, tablets laptops, and other portable electronic devices that can cause driver distraction. Hands-free device use is **NOT** allowed.

- GPS units and devices used for navigation may only be used if factory installed or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road. Electronic devices shall be setup for operation prior to commencing driving activities and shall **NOT** be changed by the driver while driving.

3. Vehicle Inspections

The driver shall conduct pre-trip vehicle inspections prior to each trip. A vehicle inspection checklist, [S3AM-005-FM2](#), can be used to guide and document the inspection process. Vehicle inspection is to include a 360-degree walk around and visual inspection under the vehicle for leaks and obstructions prior to moving the vehicle.

4. Training

All drivers shall complete defensive driver training. Additional training (i.e., hands-on defensive driver training) may apply for medium and high-risk drivers; see Driving procedure [S3AM-005-PR](#) and SHE Training procedure [S3AM-003-PR](#) for more details.

5. Journey Management Plan

Drivers who undertake trips in excess of 250 miles (400 kilometers) one way, drive in remote or hazardous areas, or when otherwise deemed necessary, shall develop and document a Journey Management Plan using [S3AM-005-FM1](#) or equivalent.

6. Secure Loads

Cargo is only to be carried within the passenger compartment of a vehicle when segregated and restrained to prevent objects from becoming distractions, obstructions, or projectiles to occupants should emergency vehicle maneuvers be required (e.g., harsh braking or crash). All

goods transported on flatbed trucks or in pickup beds must be securely fastened to prevent them from becoming hazards. All applicable laws and regulations regarding securing of loads must be met. It is prudent to check the load after a few miles to ensure that load has not shifted or loosened prior to completing the remainder of the trip.

7. Backing Up

Reversing the vehicle is to be avoided if at all possible. If backing up is necessary, use the following guidelines:

- ✓ Pre-plan all vehicle movements.
- ✓ If the pull-through method of parking is not possible, drivers will scan parking spot/area for hazards and back in; thereby, facilitating departure where the first move is forward.
- ✓ A light tap of the horn should be used to alert others of your intention to back up.
- ✓ Avoid tight spaces.

Vehicles rated over 10,001 pounds (4,536 kilograms) gross vehicular weight are required to have a competent spotter in place when backing. A competent spotter is one that has received spotter training. (For additional requirements pertaining to vehicles in this weight rating, see Commercial Motor Vehicles procedure [S3AM-320-PR](#)).

All vehicles shall have a competent spotter in place when backing in an active work zone. Parking and public access areas are recommended but not required to have a spotter.

3.5 Fitness for Duty

One of AECOM's nine Life-Preserving Principles is Fitness for Duty (see Fitness for Duty procedure [S3AM-008-PR](#)). Fitness for Duty means that individuals are in a state (physical, mental, and emotional) that enables them to perform assignments competently and in a manner that does not threaten the health and safety of themselves or others. On certain projects or for specific tasks, fit for duty certifications may be requested of medical providers by SH&E Managers or Human Resources (HR). Employees should ensure they are fit for duty prior to leaving home and unimpaired by substances or fatigue, and if necessary, contact your supervisor rather than attempting to report to work in unfit condition. Supervisors must observe their employees and work with the employee, SH&E staff, and HR to address deficiencies. AECOM will **NOT** tolerate retaliation against any employee for filing a complaint or concern regarding their fitness for duty or participating in any way in an investigation.

3.5.1 Medical Surveillance

AECOM's [S3AM-128-PR Medical Screening and Surveillance](#) details the requirements to participate in a medical monitoring program. Medical Surveillance provides a streamlined process to determine if employees meet the physical requirements to perform assigned duties as defined by applicable regulations. It is also designed to provide a means to collect data relevant to exposure to chemical and physical agents for the protection of the workers and to confirm the effectiveness of health and safety programs. The scope of work outlined in Section 2.3 involves the following types of medical surveillance:

Task or Exposure	Type of Screening or Surveillance

Working in an exclusion zone and the regulatory required exposure limit is anticipated to be exceeded.

HAZWOPER Baseline (Initial), Annual, and Exit Physicals

3.5.2 Proactive Health

AECOM is committed to promoting proactive health activities in addition to the planning for prevention of safety and environmental incidents. Proactive health activities will be completed on an on-going basis at AECOM on a corporate-wide basis (i.e., the wellness program associated with employee benefits), at offices, and at this project site. Management will be actively involved in providing and encouraging opportunities for health and wellness education and improvement. Health initiatives and education will be discussed periodically during office-based meetings as the safety moment or during the daily tailgate meeting as a toolbox talk. Topics may be related to, but are not limited to, the following:

- ✓ Heart health
- ✓ Stress management
- ✓ Smoking cessation
- ✓ Diabetes prevention
- ✓ Diet
- ✓ Exercise benefits

Topics and educational materials can be located on the AECOM Wellness page, National Institutes of Health website, Centers for Disease Control and Prevention website, and other reputable sources online.

In addition, the field team will be encouraged to participate in a daily stretch and flex routine (a standardized way to avoid soft tissue damage from work activities) to the best of their abilities, given their own personal limits. It is particularly beneficial to warm and loosen muscles before repetitive work, manual handling of loads, and when working in cold temperatures or with static postures. The Stretch and Flex manual and poster (**Attachment D**) serve as guidance for the leader to follow.

3.5.3 Fatigue

One aspect of fit for duty is fatigue management. AECOM has developed procedures that limit work periods or requires additional rest under certain circumstances, including during long-distance travel or when working at high altitudes. These procedures also set limits on extended work periods of 14 hours per day or 60 hours per week. A fatigue management plan is required if longer working hours are necessary (see Fatigue Management Procedure [S3AM-009-PR](#)).

3.5.4 Fatigue and Driving Safety

The effect of fatigue is both physiological and psychological and can severely impair a driver's judgement. Fatigue can cause lapses in concentration which could prove fatal. Fatigue is not just a problem for drivers on long trips, as drivers can also suffer from fatigue on short trips.

- ✓ After strenuous fieldwork, consider overnight accommodation or vehicle sharing for staff who are not acclimatized to the type of work.
- ✓ Microsleep can occur with a limited warning, and may be linked to several factors, for example:
 - o Microsleep is most likely to occur during times when the circadian rhythm dictates the body should be asleep, such as at dawn, late at night, or in the mid-afternoon (e.g., 1 and 4 am and 1 and 4 pm.).

- o Potential to feel drowsy after a meal.
- o Driving long distances (considered potentially monotonous) even with sufficient sleep.
- o Prolonged sitting and warm ambient temperature may also increase the feeling of sleepiness.
- ✓ If safe to do so, consider undertaking actions to disrupt the microsleep event while identifying a safe place to stop, e.g., open a vehicle window, listen to upbeat music/change music source or ask the passenger (if present) to engage in conversation.
- ✓ Ensure field staff are familiar with the signs of fatigue and mitigation factors.

The most common visible signs of microsleep include the following:

- Eyelid drooping
- Head nodding
- Wandering thoughts
- Eyelid closure
- Brief periods of snoring

If any of the above become apparent, immediately pull over to a safe location and contact your PM or SH&E representative.

3.5.5 Substance Abuse

Drug and alcohol abuse pose a serious threat to the health and safety of employees, clients, and the general public as well as the security of our job sites, equipment and facilities. AECOM is committed to the elimination of illegal drug use and alcohol abuse in its workplace and regards any misuse of drugs or alcohol by employees to be unacceptable. AECOM Substance Abuse Prevention Procedure ([S3AM-019-PR](#)) prohibits the use, possession, presence in the body, manufacture, concealment, transportation, promotion or sale of the following items or substances on company premises. Company premises refer to all property, offices, facilities, land, buildings, structures, fixtures, installations, aircraft, automobiles, vessels, trucks and all other vehicles and equipment - whether owned, leased, or used.

- Illegal drugs (or their metabolites), designer and synthetic drugs, mood or mind altering substances, and drug use related paraphernalia unless authorized for administering currently prescribed medication;
- Controlled substances that are not used in accordance with physician instructions or non-prescribed controlled substances; and
- Alcoholic beverages while at work or while on any customer- or AECOM-controlled property.

This policy does not prohibit lawful use and possession of current medication prescribed in the employee's name or over-the-counter medications. Employees must consult with their health care provider about any prescribed medication's effect on their ability to perform work safely and disclose any restrictions to their supervisor.

Although some states may pass laws legalizing medical or recreational marijuana use, the use, sale, distribution and possession of marijuana are violations of federal law and AECOM policy, and will subject an employee to disciplinary action up to and including termination in accordance with controlling law. In Canada, where medical and recreational marijuana use is legal, employees must still follow Federal and Provincial laws, and AECOM policy with regards to use and possession. Employees found to be in contravention of legal requirements or AECOM policy will be subject to disciplinary action up to and including termination.

3.6 Rewards and Recognition

One of AECOM's Life Preserving Principles is Recognition and Rewards for proactive safety, health and environmentally focused behaviors. All projects are expected to participate in the rewards and recognition programs available on the Corporate and DCS Americas SH&E ecosystem pages. Large, long term projects are encouraged to establish a project specific rewards and recognition program which incorporates project specific goals and activities ([template available S3AM-020-FM1](#)). **All rewards and recognition programs must emphasize the 9 Life Preserving Principles and proactive SH&E activities NOT solely the achievement of lagging metrics ("injury/incident-free" hours, etc.) as those may discourage incident reporting.**

There are several possible appropriate methods of rewarding and recognizing employees and contractors:

1. **Informal** – recognition via verbal acknowledgement, email, spot awards, luncheons, etc.
2. **Formal** – recognition via DCS Americas Programs:
 - AECOM Safety Star Recognition Program
 - AECOM Making a Difference (MAD) Award
 - Executive Challenge Coins



3.7 Hand Safety

The hands are exposed to hazards more than any body part. SH&E Hand Safety Procedure [S3AM-317-PR](#) describes requirements and best practices including these notable practices:

- **All personnel shall have gloves in their immediate possession 100%** of the time when in a shop or on a work site. Gloves that address the hazard shall be worn when employees work with or near any materials or equipment that present the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc. Use the Gloves Needs Assessment ([S3AM-317-FM1](#)) to help determine the appropriate glove for the hazard(s).
- **Fixed open-blade knives are prohibited** from use during the course of AECOM work. Examples of fixed open-blade knives include pocket-knives, multi-tools, hunting knives, and standard utility knives. For more information about cutting tools, see [S3AM-317-ATT1](#) Safe Alternative Tools.

3.8 Safety Observations

Safety observations are observations made by employees or subcontractors of a condition or behavior which could contribute to an incident, prior to the incident occurring. Observations can also identify positive behaviors or interventions which contribute to the prevention of incidents. Large, long-term projects may benefit from the use of LifeGuard™ to track and trend observations on a site level. All other projects should log their observations using IndustrySafe™. Both reporting systems can be accessed on any safety page of Ecosystem or by using the QR codes below from a smartphone/device while off the AECOM network.



3.9 Newly Hired or Transferred Employees

All newly hired or transferred employees with fewer than 6 months experience working on field projects or an employee who has not completed the required training or received required certifications are considered "Short Service Employees", or "SSEs" (see the Newly Hired or Transferred Employees procedure, [S3AM-015-PR](#)). The Project Manager will identify all SSEs working on the project, and each SSE will be assigned to an experienced team member so all activities may be monitored. All SSEs working or visiting a field environment are required to wear a green hard hat for safety and identification purposes. In the event a client has an existing SSEs program, AECOM will defer to the identification system required by the client. Any new employee shall wear the designated SSE identifier until the Project Manager determines the employee has the knowledge, skills, and ability related to the specific hazard on the project.

The project scope of work does **NOT** currently involve SSEs. If it becomes necessary to use one or more SSEs to complete the project scope of work, then they will be evaluated and approved in advance by the AECOM Project Manager prior to mobilizing to site and listed in this HASP.

3.10 Stop Work Authority

AECOM empowers and expects all employees to exercise their Stop Work Authority (see Stop Work Authority Procedure [S3AM-002-PR](#)) if an incident appears imminent, or when hazardous behaviors or conditions are observed. A stop work request can be informal if the situation can be easily corrected or may require shutting down operations if revised procedures are necessary to mitigate the hazard. If an AECOM employee observes an imminently hazardous situation on a site controlled by others (i.e., a client-managed contractor), the employee can always stop work for themselves by removing themselves from the situation. Employees also may attempt to stop work to avoid allowing the contractor to come to harm by immediately notifying the contractor foreman or site engineer, or if necessary, the client or party managing the contractor.



No employee should object to the issuance of a stop-work request, nor can any disciplinary action be levied against the employee. All employees must agree that the situation has been mitigated before resuming work. No employee will be disciplined for refusing to work if they feel it is unsafe.

3.11 Lone Worker Management

AECOM discourages employees from working alone (i.e., where AECOM personnel are out of visual and audio range of others) when performing field tasks (see SH&E Procedure [S3AM-314-PR, Working Alone](#)). Note that under

no circumstances should Newly Hired or Transferred Employees be permitted to work alone, and lone workers are **NOT** permitted to perform high risk tasks. If lone work is to be performed, a communications/check-in plan must be developed. The scope of work outlined in section 2.3 does **NOT** involve the lone worker operations.

4. ROLES AND RESPONSIBILITIES

Roles and responsibilities for the project team are defined below. The Project Manager (PM) is ultimately responsible for the development of this HASP and establishing a budget to implement the controls and training required. The PM is also responsible for ensuring that the plan is implemented, that appropriate documentation is generated, and that records are maintained. The SH&E Manager is responsible for reviewing and approving this HASP and assisting with other SH&E matters upon request. A Site Safety Officer may be appointed to oversee implementation of the HASP in the field. All project team members are responsible for reviewing and abiding by this HASP, performing daily (or more frequent) task hazard assessments, stopping work when necessary to correct unsafe behaviors or conditions, and reporting incidents promptly to the PM and AECOM Incident Reporting Hotline.

DCS Americas Incident Hotline: 1-800-348-5046

4.1 Project Manager

The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The PM will provide the site supervisor with work plans, staff, and budgetary resources, which are appropriate to meet the safety needs of the project operations. Some of the PM's specific responsibilities include:

- Project start-up activities require appropriate SH&E planning prior to work commencing, including identification of hazards, associated risk, and appropriate controls for each task and operation found in the work scope.
- Completed project risk registers /task hazard assessments shall be incorporated into the Project's HASP.
- Verifying that personnel, to whom this HASP applies, including AECOM subcontractors, have received a copy of it, with ample opportunity to review the document and to ask questions.
- Providing the concurring SH&E Manager with updated information regarding conditions at the Site and the scope of site work if changes occur that will affect the accuracy of this HASP.
- Providing adequate authority and resources to the Site Supervisor or Site Safety Officer to allow for the successful implementation of all necessary SH&E Procedures.
- Maintaining regular communications with the Site Supervisor or Site Safety Officer and, when necessary, the AECOM Client SH&E Program Manager.
- Coordinating the activities of AECOM subcontractors and ensuring that they are aware of the pertinent health and safety requirements for these projects, when applicable.
- Conducting Safety System Auditing by way of Management Site Visits and/or Project Manager Self-Assessments on a regular basis.
- Approving amendments to the HASP (in conjunction with the Site Supervisor or Site Safety Officer).
- Coordinating activities with the client as needed to ensure the safe implementation of this HASP.

4.2 Site Supervisor

The Site Supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans and HASP. The Project Manager may act as the Site Supervisor while on site. The Site Supervisor's responsibilities include:

- Discussing deviations or drift from the work plan with the Site Safety Officer and Project Manager.
- Discussing safety issues with the Project Manager, Site Safety Officer, and field personnel.
- Assisting the Site Safety Officer with the development and implementation of corrective actions for site safety deficiencies.
- Assisting the Site Safety Officer with the implementation of this HASP and ensuring compliance.
- Assisting the Site Safety Officer with inspections of the Site for compliance with this HASP and applicable SH&E Procedures.
- Reviewing Project Risk Register/ Task Hazard Assessments and Task Hazard Assessments (THAs) with the work crew.
- Reporting incidents and ensuring incidents and observations are logged into Lifeguard or IndustrySafe.
- Verifying that all operations follow the requirements of this HASP and halting any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspending individuals from field activities for infractions against the HASP pending consideration by the Site Safety Officer, the SH&E Manager, and the Project Manager.

4.3 Site Safety Officer

The Site Safety Officer supports the Site Supervisor in providing a safe work environment. Not all sites will have a designated Site Safety Officer; the decision should be made by the Project Manager and SH&E Manager taking into consideration the complexity and risks of the scope of work. The Site Supervisor may act as the Site Safety Officer on sites without one. The Site Safety Officer's responsibilities include:

- Updating the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the SH&E Manager.
- Inspecting the Site for compliance with this HASP and the SH&E Procedures using the appropriate field audit inspection checklist found in IndustrySafe.
- Coordinating with Site Supervisor to review THAs with the work crew.
- Assisting as needed to report incidents and verify that incidents and observations are logged into Lifeguard or IndustrySafe.

- Working with the Site Supervisor and Project Manager to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contacting the SH&E Manager for technical advice regarding safety issues.
- Determining emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation.
- Checking that all site personnel and visitors have received the proper training, orientation and medical clearance prior to entering the Site.
- Establishing controlled work areas (as designated in this HASP or other safety documentation).
- Facilitating or co-leading daily tailgate meetings and maintaining attendance logs and records.
- Discussing potential SH&E hazards with the Site Supervisor, the SH&E Manager and the Project Manager.
- Selecting an alternate Site Safety Officer by name and informing him/her of their duties, in the event that the Site Safety Officer must leave or is absent from the Site.
- Verifying that all operations follow the requirements of this HASP.
- Issuing a "Stop Work Order" under the conditions set forth in this HASP.
- Temporarily suspending individuals from field activities for infractions against the HASP pending consideration by the SH&E Manager and the Project Manager.

4.4 Employees

Responsibilities of employees associated with this project include, but are not limited to:

- Understanding and abiding by the SH&E Procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to SH&E management for continuous improvement relating to omissions and modifications in the HASP or other safety policies and procedures.
- Notifying the Site Supervisor or Site Safety Officer of unsafe conditions and acts.
- Stopping work if there is doubt about how to safely perform a task or if unsafe acts or conditions are observed (including subcontractors or team contractors).
- Speaking up and refusing to work on any site or operation where the SH&E procedures specified in this HASP or other safety policies are not being followed.
- Contacting the Site Supervisor or Site Safety Officer or the SH&E Manager at any time to discuss potential concerns and update the THA in the field to reflect the modifications. Provide THA feedback to the supervisor for continuous improvement

- Calling the AECOM Hotline if an SH&E incident happens (+1-800-348-5046)
- Provide THA feedback to the supervisor for continuous improvement.

4.5 Subcontractors

Performance of the project scope of work does **NOT** involve the use of subcontractors. If it becomes necessary to use one or more subcontractors to complete the project scope of work, they will be evaluated in advance by the AECOM Project Manager and approved by the AECOM Project Manager and Regional SH&E Manager, as appropriate, prior to mobilizing to site, and listed in the Subcontractor section of this HASP Summary.

4.6 Visitors

Authorized visitors (e.g., client representatives, regulators, AECOM management staff, etc.) requiring entry to any work location on the Site will be briefed by the Project Manager, Site Supervisor, or Site Safety Officer on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and PPE that are required for entry to any controlled work area; visitors must comply with these requirements at all times.

If the Site visitor requires entry to any exclusion zone (EZ), but does not comply with the above requirements, the visitor will be denied access to the EZ. If the visitor disregards instructions to remain outside the EZ, work activities will be immediately suspended, and the situation reported and documented.

Unauthorized visitors, and visitors not meeting the specified qualifications, will **NOT** be permitted within established controlled work areas. If unauthorized visitors and/or visitors not meeting the specified qualifications enter a controlled work area and/or EZ, work activities will be immediately suspended, and the situation reported and documented.

5. TRAINING AND DOCUMENTATION

The following sections describe the standard practices or programs that AECOM will establish to prepare employees to perform work safely and consistent with AECOM policy and Procedures.

5.1 HASP/Site Orientation

The Project Manager shall conduct a project/site-specific HASP orientation prior to the start of field operations, with support as needed by the SH&E Manager, Site Safety Officer, or Site Supervisor. This meeting will involve representatives from all organizations with a direct contractual relationship with AECOM on the job site. Minimum items to be covered are listed in **Attachment E**. Participants will then sign the HASP Personnel Acknowledgement register at the end of the HASP.

5.2 Daily Tailgate Meetings and THA Reviews

The Site Supervisor, Site Safety Officer or designee shall facilitate a tailgate meeting to discuss the specific requirements of this HASP and review the applicable THAs prior to the commencement of daily project activities. Attendance at the daily tailgate meeting is mandatory for all employees and subcontractors at the Site contracted to AECOM. Simultaneous operations are encouraged to attend each other's tailgate meetings or at the very least the supervisors shall discuss the coordination of activities and associated hazards of each other's tasks. The supervisor will then convey the information to the work crew. The Tailgate Meeting must be documented by the Site Supervisor or Site Safety Officer on a Daily Tailgate Meeting form, a blank copy of which is included in **Attachment B**.

As part of the daily tailgate meeting, employees and subcontractors will be encouraged to voluntarily warm up and stretch select muscle groups to the best of their ability and within each person's individual limitations. Stretching is particularly beneficial to warm and loosen muscles before repetitive work, manual handling of loads, and when working in cold temperatures or with static postures. The exercises included in Attachment D may be used to facilitate these efforts.

5.3 Worker Training and Qualifications

All personnel at this site must be qualified and experienced in the tasks they are assigned. SH&E Training Procedure [S3AM-003-PR](#) establishes the general training requirements for AECOM employees.

Check all required training on the table below. Verify training records of employees and subcontractors.

Site Specific Training Requirements

Training	Applies to
☒ ERP/HASP and Site Orientation	All Employees and Subcontractors
☒ Vehicle/Driver Safety & Defensive Driving	All Employees who drive on behalf of AECOM
☐ Field Safety	Employees visiting the field that does not require HAZWOPER

Site Specific Training Requirements

Training	Applies to
☒ Speak Up/Listen Up (SULU)	All AECOM field employees and supervisors
☒ First Aid / CPR	Designated employees or employees performing high risk activities and medical attention is more than 4 minutes away
☐ Respiratory Protection & Fit Test	Employees needing to wear respirators
☐ OSHA 10-Hr. Construction Safety (or CSTS 2020 in Canada)	Refer to Section 5.3.1 for guidance
☐ OSHA 30-Hr. Construction Safety	Refer to Section 5.3.1 for guidance
☒ HAZWOPER 40-Hour and 8-Hr. Annual Refresher	On HAZWOPER sites, in EZ, exposed to hazardous contamination
☒ HAZWOPER Supervisor	Employees managing others in HAZWOPER activities or at HAZWOPER Sites
☐ Hazardous Materials Shipping (U.S.)	Employee responsible for shipping HZM/HZW/DG and/or signing manifests
☐ Transportation of Dangerous Goods (CAN)	Employees responsible for shipping/transporting regulated hazardous materials that exceed regulatory requirements
☒ Annual Medical Surveillance / Clearance	Employees working in an exclusion zone and the regulatory required exposure limit is exceeded for 30 or more days a year
☐ Biennial Medical Surveillance / Clearance	Working in an exclusion zone more than 30 days a year and the regulatory required exposure limit is NOT exceeded
☐ Under Bridge Inspection Unit (UBIU) AECOM University module	Employees working in a UBIU
☒ All-Hands Coronavirus Training:	All Employees performing work during the COVID-19 Pandemic
☐ Local and/or Client Requirements:	[If applicable, specify]

5.3.1 OSHA 10-Hr. (or CSTS 2020)/OSHA 30-Hr. Training

OSHA 10 (or CSTS 2020 in Canada) and OSHA 30 training is required for projects with construction, demolition or construction/industrial-like hazards. "Construction//industrial-like hazards" occur on sites where the focus is **not** construction/industrial activities, but where our scope includes work activities involving work at heights, confined space, hot work, and/or lifting/hoisting loads or work around heavy construction equipment or "yellow iron." Examples of heavy construction equipment include excavators, bull dozers, graders, articulated dump trucks, pile drivers, and large air or mud rotary drill rigs. Smaller equipment like bobcats, road worthy commercial trucks, and hollow-stem auger drill rigs would not be considered heavy construction equipment.

This training is needed if this type of work is being performed within our work area or if it may impact our work area. It is not applicable if our work area is separated from the construction/demolition/industrial area with enough distance or physical barriers that fully prevent exposure of our team to those hazards. This includes projects where we serve as Inspectors, or any work where our employees are exposed to construction/industrial site hazards.

OSHA 30 hr. training is required for supervisors in the United States. The term "supervisor" has many different

meanings. The requirement to complete the OSHA 30 hr. course will be based on field supervisory roles and responsibilities, not administrative supervision roles. Field supervisors required to take the OSHA 30 course are defined as those individuals who provide work direction and leadership directly to AECOM field personnel and/or our subcontractors for construction/demolition activities or tasks that have construction/industrial-like hazards. These supervisors must be knowledgeable of construction hazards and controls because they are responsible for:

- Field implementation of a construction/demolition scope of work;
- Controlling performance on the job site;
- Evaluating and controlling hazards & preventing site safety risks; and
- Intervening to prevent unsafe actions or conditions of employees, clients, and subcontractors related to construction/demolition hazards.

5.4 Competent Person

A competent person is an employee who, through education, training, and experience, has knowledge of applicable regulatory requirements, is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

AECOM's Competent Person Designation Procedure, [S3AM-202-PR](#), explains the roles, responsibilities and procedures of naming a competent person. Complete the table below and include an [S3AM-202-FM1](#) Competent Person Designation Form for each AECOM competent person (subcontractors to use an equivalent process). The following activities require and have been assigned a competent person:

Competent Person Log

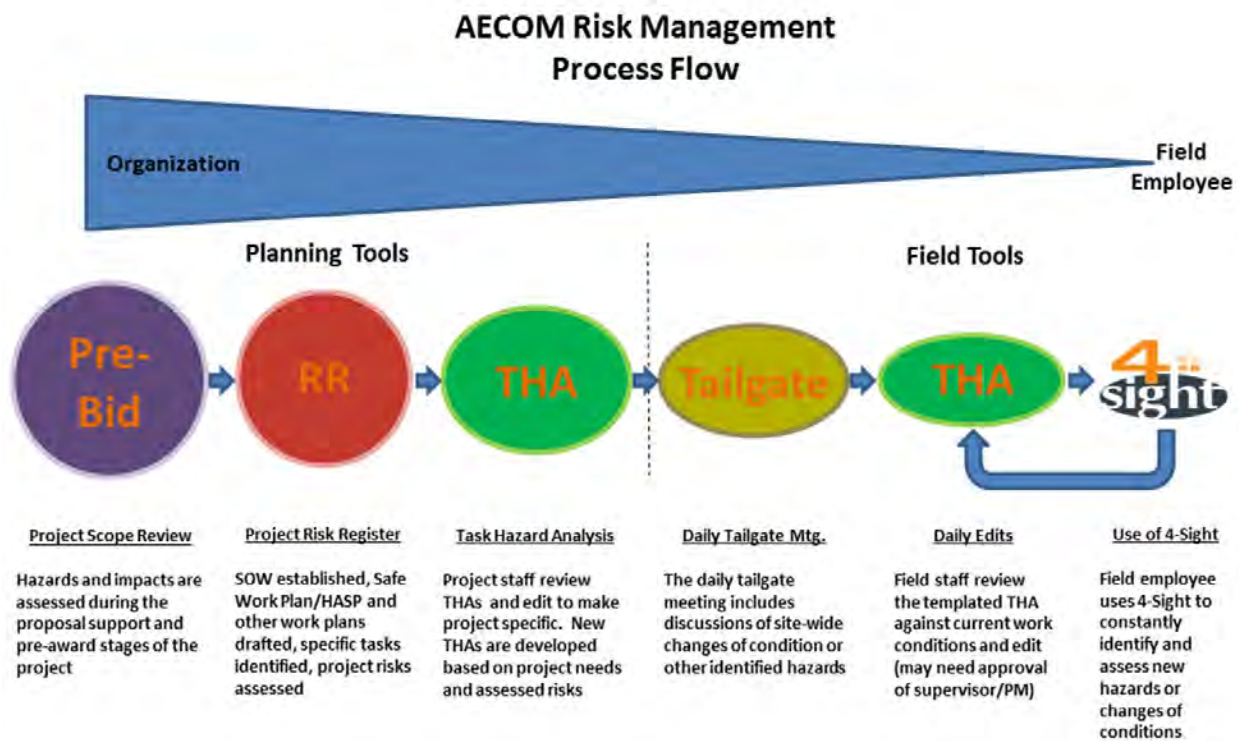
Activity / Area of Competency		Name of Person (Affiliation) Note: Subcontractor may provide this person
☐	Asbestos	
☐	Assured Equipment Grounding Conductor	
☐	Blasting & Explosives	
☐	Concrete & Masonry Construction	
☐	Confined Spaces	
☐	Control of Hazardous Energy (Lockout-Tagout)	
☐	Crane Assembly / Disassembly	
☐	Cranes & Derricks	
☐	Demolition	
☐	Electrical Wiring Design & Protections	
☐	Elevated Work Platforms & Aerial Lifts	
☐	Fall Protection	
☐	Hearing Protection	

Competent Person Log

Activity / Area of Competency		Name of Person (Affiliation) Note: Subcontractor may provide this person
☐	Heavy Equipment	
☐	Ionizing Radiation	
☐	Lead	
☐	Material Hoists & Personnel Hoists	
☐	Respiratory Protection	
☐	Rigging Equipment	
☐	Scaffolds	
☐	Stairways & Ladders	
☐	Steel Erection	
☐	Trench & Excavations	
☐	Underground Construction	
☐	Welding & Cutting	

6. HAZARD ASSESSMENT AND CONTROL

AECOM has adopted an approach to hazard assessment and control that incorporates both qualitative and quantitative methods to identify hazards and the degree to which they may impact employees and AECOM operations. See [S3AM-209-PR, Risk Assessment and Management](#), for details regarding AECOM's process. This approach is illustrated below and described in the following section.



6.1 SH&E Procedures

All AECOM SH&E procedures, in their controlled copy version, are available on the [internal SH&E Policy and Procedures ecosystem page](#). Programmatic procedures referenced in this document (for example SH&E Training) do not need to be printed for inclusion in this HASP. The applicable field procedures checklist is in the Physical Hazards section below and procedures are included in **Attachment C**.

6.2 Task Hazard Assessments (THAs) and Daily Tailgate Meeting Form

THA forms (a blank version is located in [S3AM-209-PR](#)) shall be prepared for each task to be performed as part of the scope of work. This includes driving to the Site, parking, and walking as well as the hazards, associated risk, and appropriate controls for all other work activities. The [DCS Americas Templated THA Library](#) may also be used to find

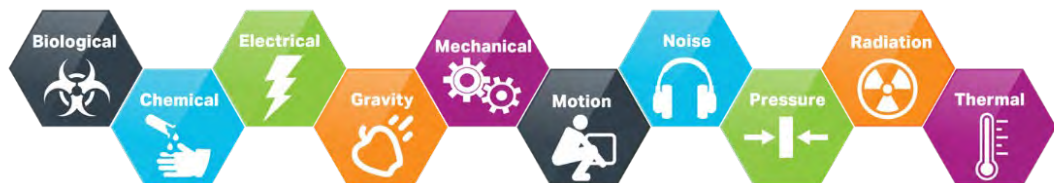
previously approved THAs, though these should be modified to be project and site-specific. The preparer shall have one THA form for each task in the Scope of Work found in this work plan (**Attachment B**) and shall also include blank copies.

In the field, all employees and visitors shall review the daily the THAs and complete and sign the Daily Tailgate Meeting Form [S3AM-209-FM5](#). Many times, when employees arrive in the field, situations are different than originally planned for or additional job steps are required. The THA asks workers update or 'dirty up' the THA in the 'On-Site Edits' rows to assess the risks presented by the changed condition and requires the worker to describe steps to reduce the risk. If the hazard(s) cannot be successfully mitigated, the work is **NOT** allowed to proceed.

6.2.1 Hazard Categories

THAs should include consideration of the following hazard categories when identifying hazards and task specific controls:

- Biological
- Chemical
- Electrical
- Gravity
- Mechanical
- Motion
- Pressure
- Noise
- Radiation
- Thermal



6.3 4 Sight

When preparing hazard assessments and throughout the day workers should use 4-Sight. This is a mental process through which workers ask themselves (and each other) four questions designed to effectively assess hazards. Using these questions during each task, especially those without established THAs, will help workers identify hazards and condition changes so that they can control them or stop work to seek assistance.



- **What am I about to do?**
- **What could go wrong?**
- **What could be done to make it safer?**
- **What have I done to communicate the hazard?**

6.4 Speak Up/Listen Up

All AECOM employees have a responsibility to help create the environment where the expectation is Safety for Life. Speak Up/Listen Up (SULU) is a technique to steward jobsite safety by utilizing 4-Sight as a basis for safety feedback conversations. SULU has two main parts:

- **Speak Up** where employees use three simple steps when providing feedback to others about unsafe acts:
 - o Ask to discuss their hazard assessment or 4-Sight for the task;
 - o Get a commitment from the employee to apply the hazard controls and perform the task according to the accepted procedures; and
 - o Follow up to ensure the employee is working safely

- **Listen Up** where employees use two simple steps when responding to safety feedback:
 - o Listen – Focus on the message, not the messenger; and
 - o Commit to performing the task the safer way

SULU conversations should happen consistently throughout the workday to create clear expectations of how work should be performed. All employees should recognize safe work behaviors in order to reinforce them and keep them going. An occasional correction is much more effective when employees are frequently encouraged and positively recognized for their safe actions. Managers and supervisors should be having SULU conversations during site visits and ensure peer to peer and site supervisor to crew SULU conversations are being held.

7. PHYSICAL AND BIOLOGICAL HAZARD ASSESSMENT

A physical hazard is a hazard that threatens the physical safety of an individual; contact with the hazard typically results in an injury. The following table summarizes the physical hazards or activities containing physical hazards present at the Site and the associated procedures that address protection and prevention of harm.

All checked procedures **MUST** be included in **Attachment C** for implementation and reference. The following hazards and their site specific description are anticipated based on the scope of work and project site:

Hazard/ Activity (Note: Text in this column links to procedure)	Site Specific Description (Where, What Phase of Work, Frequency, Etc.)	Applicable Procedure
☐ Abrasive Blasting		S3AM-335-PR
☐ Aerial Work Platforms		S3AM-323-PR
☐ All-Terrain Vehicles		S3AM-319-PR
☐ Blasting and Explosives		S3AM-336-PR
☒ Bloodborne Pathogens	First Aid Providers	S3AM-111-PR
☐ Cofferdams		S3AM-344-PR
☒ Cold Stress	Continuous exposure when ambient air temperature is below 32 °F (0 °C) or when ambient air temperature is below 50 °F (10 °C) with wet/damp conditions.	S3AM-112-PR
☐ Compressed Air Systems and Testing		S3AM-337-PR
☐ Compressed Gases		S3AM-114-PR
☐ Concrete Work		S3AM-338-PR
☐ Confined Spaces		S3AM-301-PR
☒ Corrosive Reactive Materials	Handling pre-preserved bottles for sampling	S3AM-125-PR
☐ Cranes and Lifting Devices		S3AM-310-PR
☐ Demolition		S3AM-339-PR
☐ Diving (scientific and commercial)		S3AM-334-PR
☐ Drilling, Boring & Direct Push Probing		S3AM-321-PR
☐ Electrical Safety		S3AM-302-PR
☐ Excavation & Trenches		S3AM-303-PR
☐ Fall Protection		S3AM-304-PR
☐ Flammable and Combustible Liquids		S3AM-126-PR
☐ Gauge Source Radiation		S3AM-122-PR
☒ Hand and Power Tools	Accessing monitoring wells	S3AM-305-PR
☐ Hazardous Waste Operations		S3AM-117-PR

Hazard/ Activity (Note: Text in this column links to procedure)	Site Specific Description (Where, What Phase of Work, Frequency, Etc.)	Applicable Procedure
☒ Heat Stress	Continuous exposure when ambient air temperature is above 80 °F (26.6 °C) <u>and</u> a standard work uniform is worn or when ambient air temperature is above 70 °F (21.1 °C) <u>and</u> impermeable chemical protective clothing is worn.	S3AM-113-PR
☐ Heavy Equipment		S3AM-309-PR
☐ High Altitude		S3AM-124-PR
☐ Highway and Road Work		S3AM-306-PR
☐ Hoists Elevators and Conveyors		S3AM-343-PR
☐ Hot Work		S3AM-332-PR
☐ Ladders		S3AM-312-PR
☐ Lockout Tagout		S3AM-325-PR
☐ Machine Guarding Safe Work Practice		S3AM-326-PR
☐ Marine Safety and Vessel Operations		S3AM-333-PR
☐ Material Storage		S3AM-316-PR
☐ Mine Site Activities		S3AM-341-PR
☐ Mining Operations		S3AM-345-PR
☐ Noise		S3AM-118-PR
☒ Non-Ionizing Radiation	Frequent exposure to sunlight during daylight hours	S3AM-121-PR
☐ Overhead Lines		S3AM-322-PR
☒ Pandemic Virus	Potential exposure during travel and field task(s)	SR1-003-PR2
☐ Powder-Actuated Tools		S3AM-327-PR
☐ Powered Industrial Trucks		S3AM-324-PR
☐ Radiation		S3AM-120-PR
☐ Railroad Safety		S3AM-329-PR
☐ Respiratory Protection		S3AM-123-PR
☐ Scaffolding		S3AM-311-PR
☐ Steel Erection		S3AM-340-PR
☐ Temp. Floors, Stairs, Railings, Toe-boards		S3AM-342-PR
☐ Underground Utilities		S3AM-331-PR
☐ Underground Work		S3AM-330-PR
☒ Wildlife, Plants and Insects	Working outside, exposed to plants/wildlife,	S3AM-313-PR
☐ Working Alone		S3AM-314-PR
☒ Working on and Near Water	Well decommissioning	S3AM-315-PR

7.1 Pandemic Virus

COVID-19 is a disease that results from infection of the virus identified as SARS-CoV-2. SARS-CoV-2 is a Coronavirus, one of a large family of viruses found in both animals and humans. Some infect people and are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) with symptoms such as fever, cough, and shortness of breath. There currently is no human vaccine available for this virus.

Key AECOM resources can be found at the AECOM Ecosystem Coronavirus Information Center on the Ecosystem homepage or [at this link](#), the [Coronavirus Smart Card](#), and the AECOM Pandemic Procedure: [SR1-003-PR2](#). Additional resources can be found at the following non-AECOM websites:

- [Center for Disease Control and Prevention \(CDC\)](#).
- [World Health Organization \(WHO\)](#).

8. CHEMICAL HAZARD ASSESSMENT

A chemical hazard is a type of occupational hazard caused by exposure to chemicals in the workplace. Exposure to chemicals in the workplace can cause acute or long-term detrimental health effects. Potential exposure to chemical hazards on AECOM projects can come from several sources including materials brought on site to perform work, constituents of concern found in environmental media under investigation, and simultaneous operations being performed at the Site by the property owner/third parties.

8.1 Potential Exposure Pathways

Occupational exposure to chemical hazards associated with the work activities could potentially occur by two primary routes (inhalation and skin contact) and one indirect route (incidental ingestion). These exposure pathways are discussed below.

8.1.1 Inhalation

The primary risks associated with AECOM's scope of work pertain to potential exposure to airborne contaminants and explosion hazards. Constituents that potentially pose an occupational concern to employees by the inhalation route are carbon monoxide, hydrogen sulfide, methane, and volatile organic compounds. Air monitoring may be performed in the work area and within the employee's breathing zone to assess the need to implement appropriate control measures or stop work. In addition, air monitoring will be performed at the source to assess potential explosion hazards. See Section 9, Air Monitoring for additional information regarding the air monitoring requirements for this project.

8.1.2 Skin Contact (Absorption)

Personnel handling residual product or waste and associated equipment may be exposed to chemical hazards by skin contact or adsorption. However, exposure is expected to be limited since workers will be required to wear appropriate PPE (i.e., appropriate work gloves, body clothing, and/or face shield).

8.1.3 Ingestion

Personnel handling residual product or waste and associated equipment, including project hazardous materials, may be exposed by incidental ingestion. Typically, this exposure occurs if proper PPE was not used or personal hygiene was not practiced. Personal protection against exposure via ingestion can be accomplished by performance of proper decontamination procedures when exiting contaminated work areas as well as using the correct PPE.

8.1.4 Sources of Potential Chemical Exposures

Depending on the source of potential chemical hazard and the likelihood of exposure, certain measures will be taken to protect AECOM employees as specified below.

☐	Exposure to chemical hazards is NOT anticipated
☒	Hazardous chemicals will be used to perform the work (see Section 8.2)
☐	Exposure to constituents of concern found in environmental media is likely (See Section 8.3)
☐	Exposure to chemical hazards is possible due to activities of the site owner or other parties (see Section 8.4)

8.2 Hazardous Materials Communication

Hazardous materials that will be used on the Site to perform the work can include a variety of products including sample preservatives, grout, concrete, paints, adhesives, decontamination solutions, etc. Safety data sheets (SDSs) must be available for all hazardous products that will be stored or used on the Site that exceed usual household quantities.

Their properties, hazards, and associated required controls will be communicated to all affected staff and subcontractors in accordance with the requirements of AECOM Procedure [S3AM-115-PR](#) Hazardous Materials Communication including these key elements:

- All personnel shall be briefed on the hazards of any chemical product they use and shall be aware of and have access to the Safety Data Sheets (SDS).
- All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

In addition, any employee or organization (contractor or subcontractor) intending to bring any hazardous material onto this AECOM-controlled work site must first provide a copy of the item's SDS to the Site Supervisor or Site Safety Officer for review and filing. The Site Supervisor or Site Safety Officer will maintain copies of all SDS on site and in **Attachment F**. SDS may not be available for locally obtained products, in which case an alternate form of product hazard documentation will be acceptable.

See [S3AM-110-PR](#), Toxic and Hazardous Substances, for information on planning, training, monitoring, and details on several specific chemicals (Benzene, Cadmium, Chromium, Hydrogen Sulfide, Lead, and Silica).

8.3 Constituents of Concern

Based on information obtained from historical investigations and other sources, the chemicals in the table below are known or suspected to be present at the Site.

Summary of Hazardous Properties of Contaminant Exposure Hazards

Notes: PEL.....Permissible Exposure Limit TLV.....Threshold Limit Value		IP.....Ionization Potential eV.....Electron Volt			
Chemical Name	Media	Primary Routes of Exposure	PEL	TLV	IP (eV)
Other Common Site COCs					
Coal tar pitch hydrocarbons PAH	Soil, GW, Vapor, etc.	Inhalation	0.2 mg/m ³	0.2 mg/m ³	n/a

8.3.1 Decontamination

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities. Decontamination steps are outlined in Section 4.7 of the Hazardous Waste Operations procedure [S3AM-117-PR](#). Some key elements are as follows:

- All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to exiting to clean areas of the Site.
- Avoid reactions between the solutions and contaminated materials. Review the applicable SDS.
- All contaminated PPE and decontamination materials shall be contained, stored and disposed of in accordance with site-specific requirements determined by site management.
- Use caution while working around decontamination stations, including the decontamination pad, which may be a slip or trip hazard.
- Use disposable equipment when possible and practical.
- All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of PPE required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors.

All decontaminated equipment shall be visually inspected for contamination prior to leaving the Contaminant Reduction Zone (CRZ).

Decontamination Procedures & Equipment

Procedure	Equipment Needed
Remove nitrile gloves	None

Equipment Decontamination Procedures

Type Equipment	Decontamination Solution	Procedure
Water quality meter, oil/water interface probe, down-hole water sampling pumps, reusable sampling tools/ equipment	Alconox solution and deionized water	Washing: Disassemble and wash with an Alconox solution in deionized water. Rinsing: Rinse in deionized water to remove all traces of detergent.

Waste Handling for Decontamination

Waste Streams/Products	Disposal Procedures
Wash water	Dispose on site
Used PPE and other consumables (i.e., tubing, bailer, etc.)	Containerize in plastic bags and carry off-site.

8.4 Site Chemical Hazards Outside AECOM Control

AECOM frequently performs work at Client sites that are engaged in chemical manufacturing or use chemicals as part of the manufacturing process. These types of operations can potentially expose AECOM and AECOM subcontractors to chemicals. The following mitigation measures should be applied to all work performed on these sites.

- Be familiar with the facility emergency alarms/alerts
- Know where the assembly areas are for each area of proposed site activity (note that assembly areas may be dependent on the direction of the prevailing wind)
- Be familiar with the products used on site and the appropriate response measures (may differ based on location on site)
- Discuss the above as part of daily tailgate meetings.

The client or host facility/site does not engage in chemical manufacturing or use chemicals as part of their manufacturing process. Therefore, a potential exposure to site chemical hazards outside of AECOM's control is not anticipated.

9. AIR MONITORING

Depending on the contaminants of concern, the products used to perform the work, or third-party operations, sampling or monitoring may be required within the work area on site to detect the presence and relative levels of chemical or particulate hazards. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be in accordance with Exposure Monitoring Procedure [S3AM-127-PR](#) and specified in the work permit and/or THA for the tasks. Key elements of the procedure include:

- Calibration of monitoring equipment and/or daily bump tests to verify calibrations and confirm alarm function.
- Documenting the results of calibration and/or daily bump tests.
- Documenting the results of monitoring activities.
- Personal monitoring and result evaluation must be directed by a Certified Industrial Hygienist or Certified Safety Professional.

Potential exposure to chemical hazards from sources including materials brought on site to perform work, constituents of concern found in environmental media under investigation, and/or simultaneous operations being performed at the Site by the property owner/third parties are not reasonably anticipated to result vapors, fumes, aerosols, mists, and/or airborne particulates/dusts at or near permissible exposure limits and, therefore, no air monitoring is required.

10. PERSONAL PROTECTIVE EQUIPMENT

PPE is considered the last line of defense in hazard control. PPE is meant to protect workers when all other methods (elimination, substitution, engineering, and administrative) have been exhausted. All employees must be trained in the proper use and maintenance of PPE. See Procedure [S3AM-208-PR](#), Personal Protective Equipment.

A PPE assessment (see [S3AM-208-FM1](#)) can be performed to help determine PPE requirements. PPE upgrades for individual tasks or steps of a task are to be identified in the appropriate THA(s).

10.1 Site Minimum Personal Protective Equipment

Unless otherwise excluded by an approved Management of Change (MoC), the following personal protective equipment is required by AECOM and/or client procedures and requirements and shall be worn on site outside of designated "Safe Zones", such as offices and parking lots. Do **NOT** downgrade the PPE specified in the THA and/or this HASP without review and approval from SH&E Manager.

Site Minimum PPE ¹

✓ Hard hat	✓ Safety-toe work boots
✓ Safety glasses with side shields (may be clear or shaded)	✓ Long pants
✓ Reflective Vest	✓ Shirt with sleeves (short or long – cover shoulders)

10.2 Additional Personal Protective Equipment Needed on Site

The following PPE is required by the host facility, task hazard assessment (THA), or prescribed upgrades in response to air monitoring response (action) levels.

Head / Ears (select all that apply)

☐ Climbing helmet	☐ Earplugs
☐ Hard hat with chin strap	☐ Over-ear hearing protection (i.e., muffs)
☐ Wide brimmed hard hat	☐ Dual hearing protection (earplugs and muffs)
☐ Insect net	☐ Other: [specify]

Face / Eyes (select all that apply)

☐ Spoggles (Safety glasses with foam liner for dust protection)	☐ Face shield (impact)
☐ Chemical goggles	☐ Face shield (splash)
☐ Welding mask/goggles	☐ Other: [specify]

¹ All PPE must meet applicable ANSI, ASTM, or MSHA standards as applicable.

Hands (select all that apply)

☐ Abrasion, cut and/or puncture resistant	☒ <u>Chemical resistant:</u>
☐ Impact resistant	☒ Nitrile
☐ Leather	☐ PVC
☐ Mechanics	☐ Rubber/Latex
☐ Other: [specify]	☐ Other: [specify]

Legs / Feet (select all that apply)

☐ High ankle boots	☐ Rubber boots
☐ Metatarsal guards	☐ Waders
☐ Electrically resistant boots	☐ Snake gaiters or chaps
☐ Puncture-resistant boots or insoles	☐ Disposable boot covers or booties
☐ Other: [specify]	

Body (select all that apply)

☒ Sunscreen	☒ <u>Personal flotation device (PFD):</u>
☒ Insect repellent with DEET	☐ Type I ☐ Type II ☒ Type III
☐ Permethrin applied to clothing	☐ Type V – Auto-inflate with Type II performance
☐ Disposable coveralls	☐ Type V – Mustang Suit
☐ <u>Flame Retardant Clothing (FRC):</u>	☐ <u>Fall Protection:</u>
☐ Rating: [specify]	☐ Full body harness
☐ Weight: [specify]	☐ Single lanyard with self-locking D-ring
☐ Rating and weight not specified by client or facility	☐ Double lanyard with self-locking D-rings
☐ <u>High-visibility clothing:</u>	☐ Self-retracting lifeline with self-locking D-ring
☐ ANSI Class II	☐ Shock absorber
☐ ANSI Class III	☐ Lad-safe or similar device
☐ Not specified by client or facility	☐ Suspension trauma straps
☐ Other: [specify]	☐ Self-rescue kit
☐ Other: [specify]	☐ Other: [specify]

Respiratory Protection (select all that apply)

☐ <u>Air-Purifying Respirator (APR):</u>	☐ <u>Filtering Facepiece Respirator (FFR) - Required Use</u>		
☐ Full-Face	☐ N95	☐ N99	☐ N100
☐ Half-Face	☐ R95	☐ R99	☐ R100
☐ Cartridge: [Specify]	☐ P95	☐ P99	☐ P100
☐ <u>Supplied Air Respirator:</u>	☐ Other: [Specify]		
☐ Self-Contained Breathing Apparatus (SCBA)	☒ FFR / Face Covering / Face Mask – Voluntary Use		
☐ Air-Line Respirator			

Equipment (select all that apply)

☐ <u>Air and Noise Monitoring</u>	☒ <u>Weather, Heat and Cold Stress Monitoring:</u>
☐ Dosimeter	☐ Portable weather station or meter
☐ See Section 9.1 above	☒ Smart phone with weather app
☐ Other: [specify]	☐ Wet Bulb Globe Thermometer (WBGT)
☐ <u>Communication Beyond Cell Phones</u>	☐ Other: [specify]
☐ Portable, hand-held radio	☐ <u>Wildlife / Wilderness Survival:</u>
☐ Satellite phone	☐ Air horn
☐ Other: [specify]	☐ Bear spray
☐ <u>Traffic / Work Area Controls:</u>	☐ Emergency Rations
☐ See Section 11.1 below	☐ Emergency Shelter(s)
☐ Other: [specify]	☐ Other: [specify]
☒ <u>Fire Control / Protection:</u>	☐ <u>Other:</u>
☒ 5 lb ABC, Qty = 1 (AECOM Fleet Vehicles Only)	☐ [specify]
☐ [specify type], Qty = [#]	☐ [specify]
☐ [specify]	☐ [specify]
☒ <u>First Aid Kit(s):</u>	☐ [specify]
☒ Type III, Class A Qty=1	☐ [specify]
☐ Type [?], Class [?], Qty= [#]	☐ [specify]

11. SITE CONTROL

The purpose of site control is to protect the public from inadvertently coming into contact with site hazards and to protect AECOM employees being impacted by hazards. This section details the equipment and actions needed to promote optimal site control.

11.1 Site Work Zones

Site layout and site control need to be coordinated to achieve a productive work environment and efficient work process while minimizing exposure of employees and the public to hazards associated with the work. Consider the following items when planning the Site layout and controls:

- "Line of Fire" hazards- overhead utilities, falling/ tipping equipment, release of energy/ pressure, flying debris
- Noise, dust, odor suppression
- Contamination containment and decontamination area layout
- Traffic control for site vehicles/ equipment (public traffic control requires Traffic Control Plan)
- Restricted access for areas requiring special training, skills, or certifications
- Restriction of work near railroads
- Presence or creation of excavations
- Loading/unloading areas
- Portable restrooms
- Dumpsters and bins
- Equipment lay down
- Heavy equipment parking
- Overnight safety and security needs

Check the description of the Site controls **already** in place:

☒ Work area is within a facility/property with secure and restricted access provided by client or third party

☐ Work area is enclosed within a facility/property, but access is not restricted via locks, guards, or gates

☐ Work area is on a property that is open, but access by the public is unlikely

☐ Work area is on a property that is open and access by the public is likely

☐ Work area is in a roadway or right of way of a roadway (Traffic Control Plan required [S3AM-306-PR](#))

☐ Work area is on or near railroad, including right of way, active lines and crossings

☐ Other: [Insert description]

Check and describe the site controls that need to be added to protect the public and the AECOM work team.

Control Item	Description of Type and Application
☐ Fence	
☐ Locks	
☐ Barricades	
☐ Cones	
☐ Tape	
☐ Hole Covers	
☐ Other:	

11.2 Simultaneous and Neighboring Operations

Simultaneous and neighboring operations often present a need for added coordination and communication to address hazards that are presented by multiple operations.

Simultaneous Operations – Within the Site

☐ Yes, see table below for details

☒ None, not applicable

Activity	Company	Contact Person (Activity Lead)	Contact's Phone Number	Addressed in THA(s)
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No

Simultaneous Operations – Neighboring Sites

☐ Yes, see table below for details

☒ None, not applicable

Activity	Company	Contact Person (Activity Lead)	Contact's Phone Number	Addressed in THA(s)
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No

11.3 Site Control Map/Diagram

See Figure 11-1.

11.4 Site Security

All projects should be reviewed for the potential for personal security issues (e.g., assault, robbery, threat, etc.).

All facilities maintained by AECOM must maintain an Operational Security Plan (OSP) describing the conditions of the Site or facility and identifying basic emergency response procedures. This requirement applies to field trailers maintained by AECOM for use on project sites. A blank OSP template is available in Global Resilience Group Standard [GRG-001-RP4](#). The OSP must be maintained by the Project Manager at the field trailer and a copy provided to the Global Resilience Group, which can be found on [Ecosystem](#).

12. EMERGENCY RESPONSE

Any situation that has resulted or poses an imminent threat to persons, property and/or the environment constitute an emergency and require immediate action by the individual discovering and/or involved in the situation. Immediate actions start with the signaling of an emergency that is accompanied by a ceasing of site activities (i.e., Stop Work). When safe to do so, immediate actions will be taken to prevent an imminent risk from resulting in an incident and/or minimize the potential for an escalation in the severity of the incident. Immediate actions for reasonably credible emergency situations or scenarios are described within the following sections.

12.1 Communication – Method(s) of Signaling an Emergency

In addition to verbal communication amongst the field team, the following methods of communicating or signaling an emergency will be used:

☒ Cell Phone ☐ Hand Signal ☐ Radio (Channel No. **(Insert)**) ☐ Satellite Phone

12.2 Muster and Shelter-in-Place Locations

In the event of an emergency situation or imminent threat persons, property and/or environment, workers will report to the appropriate muster and/or shelter-in-place location. Workers will remain at the muster or shelter-in-place location until a headcount is completed and any "all clear" is issued by the proper authority for the Site unless it is unsafe to remain at that location.

Primary Muster Location: See Figure 11-1

Secondary Muster Location: See Figure 11-1

Shelter-in-Place Location: Field Vehicle

12.3 Location of Emergency Equipment

Site personnel will be made aware of the location of emergency equipment that can aid in the response to an emergency situation or imminent threat to persons, property and/or the environment during the Site orientation, daily toolbox safety meetings, and/or crew reviews.

Item(s)	Item Description	Location(s)
First Aid Kit(s)	Type III, Class A Qty=1]	• Field Vehicle
Automated External Defibrillator(s)	Standard AED	• N/A
Fire Extinguisher(s)	5 lb. ABC	• AECOM Fleet Vehicle
Spill Kit(s)	N/A	• N/A

Item(s)	Item Description	Location(s)
Satellite Phone(s)	N/A	• N/A
Wildlife Deterrent(s)	• N/A	• N/A
Emergency Shelter(s)	N/A	• N/A
Emergency Rations	N/A	• N/A
Personal Locating Device(s)	N/A	• N/A
Thermal Protective Aids	N/A	• N/A

12.4 Emergency Responders and Resources

In the event of a **life-threatening or critical emergency**, AECOM employees should immediately engage emergency responders and/or resources, as appropriate, to the type of emergency. Steps should be taken to meet and escort emergency responders and/or resources to location of the emergency whenever possible.

Emergency Responders

Fire:	Hancock Fire Department	EMERGENCY: 911 NON-EMERGENCY: (607) 637-3431
Medical Transport:	Land: Ambulance	911
	Air: N/A	N/A
	Water: N/A	N/A
Police:	Hancock Police Department	EMERGENCY: 911 NON-EMERGENCY: (607) 637-3432
Poison Control:	Poison Control Center	800-222-1222
Pollution Emergency:	NYSDEC Spill Hotline	800-457-7362
INFO TRAC:	(AECOM's Account Number: 74984)	800-535-5053

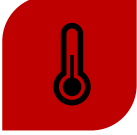
Utility and Pipeline Owners (For utility and pipeline related emergencies only)

Utility/Pipeline Name	Provider/Facility Owner	Contact No.
Call Before You Dig	(Utility One-Call Locating)	811

12.5 Fitness for Duty and Illness Reporting During the Pandemic

AECOM employees should always live our life-preserving principle of "Fitness for Duty", which requires employees to stay home from work when they are sick, as they are not "Fit for Duty" when ill. During times of pandemic, the importance of this step is increased. If you experience signs/symptoms of illness (see images below) or find out that you have come into contact with a person who has been confirmed positive with the Coronavirus, notify the site supervisor and the project manager, your Area, Regional, or Business Line SH&E Manager, and go home and/or

stay home. Notify the AECOM Incident Reporting Hotline (**1-800-348-5046**) and/or the AECOM Nurse Line (**1-512-419-5016**). Managers will work with the local SH&E and/or Resiliency teams to respond according to the AECOM Pandemic Procedure: [SR1-003-PR2](#).

			
FEVER	TIREDNESS, CONFUSION	DRY COUGH	SHORTNESS OF BREATH
			
NASAL CONGESTION, SORE THROAT OR RUNNY NOSE	BLUE LIPS OR FACE	PERSISTENT PAIN OR PRESSURE IN THE CHEST	IF ANY OF THESE SYMPTOMS ARE IDENTIFIED, SEEK MEDICAL ATTENTION!

13. NOTIFICATIONS AND REPORTING

NOTE! In the event of a life threatening emergency, call 911 FIRST. A life threatening emergency can include:

- Loss of consciousness
- Seizures
- Uncontrolled loss of blood
- Heat Stroke
- Head or spinal cord injury
- Severe allergic reaction
- Abdominal trauma
- Difficulty breathing
- Cardiac arrest
- Broken bones

Once immediate actions have been taken, if safe to do so, notifications (verbal) and reporting (written) must be immediately completed. Notifications serve to engage additional resources in the management of the emergency and initiate additional processes such as medical case management, spill response, incident investigation, etc. Reporting initiates the formal documentation process and supports the development of key learnings to prevent a reoccurrence.

13.1 Initial Notifications

The person observing and/or involved with the emergency or incident is required to make the following initial notifications as soon as reasonably possible:

Call #1 – AECOM Site Supervisor or Site Safety Officer

Role	Person Assigned to Role	Contact No. ^{Primary}	Contact No. ^{Alt.}
Primary Site Supervisor:	TBD	? TBD	? TBD
Note: D = Direct Office Phone; M = Mobile Phone, O = Office Phone, R = Radio, and S = Satellite Phone			

Call #2 – DCS Americas Incident Reporting Hotline

1-800-348-5046

DIRECT TOLL-FREE

Hours of Operation: 24 Hours/Day; 7 Days/Week

For injuries and illnesses, you should be transferred by the hotline to the AECOM Occupational Nurse:

AECOM Occupational Nurse

1-512-419-5016

DIRECT

Hours of Operation: 24 Hours/Day; 7 Days/Week

Call #3 – Affected Employee’s Direct Supervisor

Employees are encouraged to program their direct supervisor’s phone numbers into their cell phone.

Call #4 – Vehicle Management or Insurance Provider (*Vehicle Motor Vehicle Accidents Only*)

Employees involved in motor vehicle accidents or who have discovered property damage caused to motor vehicles should call the appropriate party:

ARI Fleet Management (*Fleet vehicles only*)

1-800-422-7647

DIRECT TOLL-FREE

Hours of Operation: 24 Hours/Day; 7 Days/Week

Rental Company (*Rental vehicles only*)

Refer to your rental agreement for contact numbers and hours of operation

Personal Insurance Provider (*Personal vehicles used for business travel only*)

Refer to your personal insurance policy for contact numbers and hours of operation

13.2 Client-Specific Notifications

Role	Person Assigned to Role	Contact No. ^{Primary}	Contact No. ^{Alt.}
Primary Client Contact Person:	Charles Gregory	D (518) 402-8246	? NA
Note: D = Direct Office Phone; M = Mobile Phone, O = Office Phone, R = Radio, and S = Satellite Phone			

13.3 Additional Internal AECOM Notifications

The AECOM Site Supervisor will make the following additional internal notifications. If the AECOM Site Supervisor cannot be reached or is not capable of making the notifications, the notifications will be made by an alternate AECOM Site Supervisor or AECOM Site Safety Officer.

13.3.1 AECOM Project Management

Role	Person Assigned to Role	Contact No. ^{Primary}	Contact No. ^{Alt.}
AECOM Project Manager:	Robert J. Murphy, PG	M (716) 903-1346	D (716) 923-1176
If unavailable, AECOM Project Mgr. Alternate:	James Kaczor, PG	M (716) 866-0522	D (716) 923-1300
Note: D = Direct Office Phone; M = Mobile Phone, O = Office Phone, R = Radio, and S = Satellite Phone			

The Project Manager will perform any additional internal notification requirements based on the requirements of their region, business line, or client account.

13.3.2 AECOM Safety, Health and Environment (SH&E) Management

Role	Person Assigned to Role	Contact No. ^{Primary}	Contact No. ^{Alt.}
Area SH&E Manager:	Pete Wray, CSP, CHMM, STS	M (302) 660-9178	M (302) 318-2880
If unavailable, Regional SH&E Manager:	Candice Johnson	M 416-407-9661	
Note: D = Direct Office Phone; M = Mobile Phone, O = Office Phone, R = Radio, and S = Satellite Phone			

13.4 Subcontractor and/or Third-Party Contacts

There are no subcontractors and/or third parties involved with field activities at the Site under a contractual relationship with AECOM, a contractual relationship with an AECOM subcontractor, or as part of a separate, but collaborative effort on behalf of the client.

13.5 Internal Reporting

13.5.1 Incident and Near Miss Reporting

All incidents and near misses (i.e., incidents without consequences), regardless of type and perceived severity, must be reported within **IndustrySafe** (AECOM's SH&E Database) within the timeframes listed below:

Incident Type	IndustrySafe Reporting Timeframe
Significant Incident, including any injury to an AECOM employee or Subcontractor	Within 4 hours
All Other Incidents	Within 24 Hours
Note: Only the basic facts, who, what, when, where and how, are needed to complete the initial IndustrySafe report. SH&E Managers will assist you in updating the report as additional information becomes available.	

Significant incidents include:

- Fatality;
- Amputation;
- Hospitalization for treatment for more than 24 hours (admission);
- Any single event resulting in more than one employee requiring medical treatment or more than one employee being away from work for more than 3 days;
- Any SH&E-related Consent Agreement/Order/Lawsuit or enforcement action seeking more than \$10,000 or alleging criminal activity;
- Any spill or release of a hazardous material that is reportable to a regulatory agency;
- Any Notices of Violation resulting from not operating within a regulatory agency permit/license or consent;
- Any incident resulting in property damage expected to exceed \$10,000 United States dollars (USD);

- Any security-related incident that could have caused significant harm to an AECOM employee; and/or
- Any near miss event that may have resulted in any of the above consequences, but because of "luck" did not result in harm to persons, property or the environment.

Other incidents include:

- Any injury or illness to an AECOM employee or subcontractor, even if it does not require medical attention, including non-work-related injuries/illnesses that have become significantly aggravated by the work environment;
- An injury to a member of the public or client representative occurring on an AECOM-controlled work site;
- Re-occurring conditions such as back pain or cumulative trauma disorders (e.g., carpal tunnel syndrome);
- Fire, explosion or flash that is not an intended result of a planned event (e.g., remediation process, laboratory procedure);
- Any incident involving company-owned, rented or leased vehicles (including personal vehicles used for company business); and/or
- Any failure to comply with requirements of a regulatory permit issued to AECOM.

13.5.2 Safety Observation Reporting

All safety observations must be reported within **IndustrySafe™** or **Lifeguard™** (AECOM's SH&E Databases), as dictated by the AECOM Project Manager, in a timely manner. It is recommended that safety observations are reported within 7 to 14 days of the observation.

13.5.3 SH&E Database Access

Incidents, near misses, and audits/inspections must be entered into **IndustrySafe™**, which is one of AECOM's SH&E Databases. Safety observations may also be entered into **IndustrySafe™** at the AECOM Project Manager's discretion. **IndustrySafe™** can be accessed via the SH&E Page on Ecosystem when you are in the office or connected to the AECOM network via VPN. IndustrySafe may also be accessed from your smartphone/device, if equipped with a QR Code Reader App, using the QR Code to the right.



Safety observations may also be entered into **Lifeguard™**, which is one of AECOM's SH&E Databases, at the AECOM Project Manager's discretion. **Lifeguard™** can be accessed via the SH&E Page on Ecosystem when you are in the office or connected to the AECOM network via VPN. **Lifeguard™** may also be accessed from your



↑ Incidents, Near Misses, Audits/Inspections and Safety Observations ↑

smartphone/device, if equipped with a QR Code Reader App, using the QR Code to the right.



Safety Observations



13.5.4 Reporting Assistance

If your field schedule, access to internet, and/or limited cellular phone coverage have the potential to impact timely incident, near miss, and/or safety observation reporting, please contact your AECOM Project Manager and/or SH&E Manager for assistance.

14. RESPONSE PLANS: REASONABLE CREDIBLE EMERGENCY SCENARIOS

Based on site history, operations, and setting along with the approved scope of work, the following emergency scenarios have been determined to be reasonably credible to occur. Immediate actions and post-emergency follow-up actions, when applicable, are discussed below for each reasonably credible emergency scenario.

14.1 Injuries and Illnesses

14.1.1 Immediate Actions

14.1.1.1 Engage Medical Resources

In the event of a **life-threatening or critical emergency**, AECOM employees should **dial 911 or the site-specific number** for the emergency responder and follow the recommended instructions. After dialing 911 or the site-specific number and in **less serious situations**, an injured employee or a co-worker should contact the **Incident Hotline at 1-800-348-5046** to ensure that the employee receives the best care at the best time (i.e., within the first hour following an injury or potential injury). By contacting the Incident Hotline, the worker can be connected with AECOM's nurses for first aid advice. If recommended by the nurse, the supervisor or a co-worker should drive the injured employee to the project-designated clinic or hospital.

14.1.1.2 Care for the Injured or Ill Person(s)

Employees trained in first aid, CPR and/or Automated External Defibrillators (AED) should render initial care in a manner consistent with their training. This care should be provided until the injury or illness is resolved (i.e., first aid cases) or transportation to the appropriate medical facility is arranged and present on the Site (i.e., treatment beyond first aid incidents).

First Aid, CPR and AED Trained Personnel

Name	Company	Contact No.	1 st Aid	CPR	AED
TBD			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
[Add Additional Rows]	[If needed]		☐	☐	☐

14.1.1.3 Transport to Nearest Medical Facility for Treatment

For injuries and illnesses that require treatment beyond first aid, the injured/ill person(s) shall be transported to the nearest medical facility for treatment. For life-threatening or critical emergencies, Emergency Medical Services (EMS) should handle the transport. EMS will determine the hospital to which the injured/ill person(s) will be transported. The AECOM Field Supervisor and/or Site Safety Officer shall confirm with EMS the final destination of the injured/ill

persons. The nearest hospital equipped for emergency medical care, driving directions and map are provided in **Attachment A**.

For less serious situations, the AECOM Site Supervisor, AECOM Site Safety Officer (SSO) and/or their designee shall transport and accompany the injured/ill person(s) to the nearest Occupational Clinic (preferred) or hospital, if an occupational clinic is not available, not within a reasonable driving distance, or cannot be reached during their hours of operation. The nearest occupational clinic, driving directions and map are provided in **Attachment A**.

14.1.1.4 Engage AECOM Occupational Nurse with Medical Treatment Provider

The AECOM Site Supervisor, AECOM SSO or their designee who is accompanying the injured/ill person(s) to the medical treatment facility shall notify the AECOM Occupational Nurse of the situation, communicate the destination of the injured/ill person(s) and assist the nurse in connecting with the medical treatment provider to facilitate medical case management.

14.1.2 Follow-Up Actions

Outside of notifications and reporting, the AECOM Site Supervisor, AECOM SSO or their designee shall coordinate the post-treatment transportation of injured/ill person(s).

14.2 Motor Vehicle Breakdowns and Flat Tires

If safe to do so, remove the car from the traveled way. To the extent possible, AECOM personnel should **NOT** change flat tires or perform similar repairs.

- For rental vehicles, contact the rental company
- For fleet vehicles, contact **ARI Fleet Management: 1-800-422-7647**
 - **Prompt 1 – Roadside Assistance**
 - **Prompt 3 – Maintenance Management**
- For personal vehicles used on AECOM business, contact an emergency provider.

14.3 Motor Vehicle Collisions

All vehicles should be rented through Carson Wagonlit Travel (accessible via Ecosystem) to ensure that AECOM insurance is included in the rental rate. All other insurances should be declined. AECOM's rental vehicle insurance policy for National/Enterprise or Avis can be found on the DCS Americas [United States](#) or [Canada](#) travel pages.

Drivers MUST print and carry the applicable insurance policy for the rental. For company owned vehicles, drivers MUST also print and carry proof of insurance.

14.3.1 Immediate Actions (Recommended Responses)

- Assess the situation and move all occupants (except the injured) out of further harm's way.
- If safe to do so, remove the car from the traveled way.

- Call 911, if necessary
 - o If appropriate, wait for police to arrive before moving vehicles.
- Provide insurance information to other drivers if necessary or requested and collect the same:
 - o Driver's Information:
 - Name and contact number
 - Driver's license number, expiration date and issuing state/province
 - Insurance policy number, carrier/provider and provider's contact number
 - o Vehicle Information:
 - Make, model and year
 - License plate/tag number and issuing state/province
 - Owner's name, address and contact number
 - o Passenger's Information:
 - Name and contact number
 - o Witness Information:
 - Name and contact number
- If possible, obtain names and phone numbers of witnesses.
- Sketch the accident scene and/or take photographs of the scene, if possible and **safe to do so**.
- Take photographs of the damage to vehicles and property, if possible and **safe to do so**.
- If police are **NOT** on scene, file an accident report at the local police station.

NOTE: DO NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE, OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW.

14.3.2 Follow-Up Actions

14.3.2.1 Police Report

- If the police were **NOT** on scene, file an accident report at the local police station.
- Include a copy of the police report with the IndustrySafe report (upload report to IndustrySafe).

14.3.2.2 Drug and Alcohol (D&A) Testing

Driver's that may have caused or contributed to motor vehicle collisions resulting in \$2,500 U.S. Dollars (USD) or more in damage to individuals, vehicles and/or property shall undergo drug and alcohol testing. The AECOM Site Supervisor, AECOM SSO or designee shall:

- Contact Lindsay Scammell at **1-804-515-8552** to coordinate the drug and alcohol testing;
- Accompany and transport the driver to and from the D&A testing facility; and

- Coordinate transportation for the driver pending the results of the D&A testing.

14.4 Environmental Spills/Releases

AECOM employees are not expected to take action or to participate in rescues or responses to chemical releases (including of petroleum products) beyond the initial discovery of the release and immediate mitigation actions such as closing a valve, placing absorbents, and notifying the client and or public emergency response system (911), unless there is a contractual provision for this response and specially trained employees.

14.4.1 Immediate Actions – Reportable Quantity Regulatory Agency Notifications

All environmental spills or releases of hazardous materials (e.g., fuels, solvents, etc.), whether in excess of the Reportable Quantity or not, will be reported according to the incident reporting procedure. In determining whether a spill or release must be reported to a regulatory agency, the Site Supervisor or qualified worker will assess the quantity of the spill or release and evaluate the reporting criteria against the state-specific reporting requirements, applicable regulatory permit, and/or client-specific reporting procedures. **If reporting to a US state or Federal regulatory agency is required, AECOM has 15 minutes from the time of the spill/release to officially report it. In Canada, spills notification varies by Province. Employees should review the local regulatory requirement, document it in this plan and communicate it to all personnel.**

Chemical-specific United States (U.S.) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Reportable Quantities for the known chemicals onsite are shown in the table below.

Hazardous Substance	Regulatory Synonyms	Final RQ (lbs.)
1,1,1-Trichloroethane	TCA	1,000
Arsenic	N/A	1
Benzene	N/A	10
Cadmium	N/A	10
Carbon Tetrachloride	N/A	10
Chromium	N/A	5,000
Ethyl Benzene	N/A	1,000
Lead	N/A	10
Mercury	N/A	1
Methyl Ethyl Ketone	MEK	5,000
Nickel	N/A	100
Pentachlorophenol	PCP	10
Selenium	N/A	100
Tetrachloroethylene	Perchloroethylene, PCE	100
Toluene	N/A	1,000
Trichloroethylene	Trichloroethene, TCE	100
Xylene	N/A	100

CERCLA RQ's can be found at: <http://www.epa.gov/oem/docs/er/302table01.pdf>

NYSDEC Petroleum Spill Requirements

All petroleum spills that occur at the site must be reported to the NYSDEC Spill Hotline (1-800-457-7362) within 2 hours of discovery, except spills which meet all of the following criteria:

- The quantity is known to be less than 5 gallons; and
- The spill is contained and under the control of the spiller; and
- The spill has not and will not reach the State's water or any land; and
- The spill is cleaned up within 2 hours of discovery.

A spill is considered to have not impacted land if it occurs on a paved surface such as asphalt or concrete. A spill in a dirt or gravel parking lot is considered to have impacted land and is reportable.

NYSDEC's Spill Regulations/Guidelines can be found at: <https://www.dec.ny.gov/chemical/8692.html>.

The spill containment program addresses the following site-specific information:

- Potential hazardous substance spills and available controls;
- Initial notification and response;
- Spill evaluation and response; and
- Post-spill evaluation.

14.4.2 Immediate Actions – Spill Evaluation and Response

The Field Lead/Site Supervisor and/or SSO are responsible for evaluating spills and determining the appropriate response. When this evaluation is being made, the spill area is isolated and demarcated to the extent possible. When an incidental release occurs, clean-up personnel receive instructions in a pre-clean-up meeting as to spill conditions, PPE, response activities, decontamination, and waste handling.

The procedures of the Emergency Response section of this HASP are immediately implemented when the spill is determined to require emergency precautions and action, if necessary, to protect those outside the clean-up area, notification of the appropriate authorities is made. The table in Section 14.4.1 lists the spill conditions that trigger notification of Federal, state, and local agencies.

The following are general measures that response/clean-up personnel take when responding to a spill:

- To minimize the potential for a hazardous spill, hazardous substances, control/absorbent media, drums and containers, and other contaminated materials are properly stored and labeled.
- When a spill occurs, only those persons involved in overseeing or performing spill containment operations will be allowed within the designated hazard areas. If necessary, the area will be roped or otherwise blocked off. Unauthorized personnel are kept clear of the spill area.
- Appropriate PPE is donned before entering the spill area.
- Appropriate spill control measures are applied during spill response.

- Whenever possible without endangerment of personnel, the spill is stopped at the source or as close to the source as possible.
- Ignition points are removed if fire or explosion hazards exist.
- Surrounding reactive materials are removed.
- Drains or drainage in the spill area are blocked or surrounded by berms to exclude the spilled waste and any materials applied to it.
- Provisions are made to contain and recover a neutralizing solution, if used.
- Small spills or leaks from a drum, tank or pipe will be evacuate an appropriate distance in all directions to allow clean-up and to prevent employee exposure.
- For small spills, sorbent materials such as sand, sawdust, or commercial sorbents are placed directly on the spill to prevent further spreading and aid in recovery.
- Spill area sprayed with appropriate foam where the possibility of volatile emissions exists.
- If the spill results in the formation of a toxic vapor cloud, from vaporization, reaction with surrounding materials, or the outbreak of fire, further evacuation may be required.
- To dispose of spill waste, all contaminated sorbents, liquid waste, or other spill clean-up will be placed in small quantities in approved drums for proper storage or disposal as hazardous waste. The weight of the drums shall not exceed the chemical-specific weight listed in the table above.

14.4.3 Post Spill Evaluation

As part of the incident investigation and reporting documentation, a written spill response report shall be prepared at the conclusion of clean-up operations. The report will include, at a minimum, the following information:

- Date of spill incident;
- Cause of incident;
- Spill response actions;
- Any outside agencies involved, including their incident reports; and
- Lessons learned or suggested improvements.

The spill area is inspected to ensure the area has been satisfactorily cleaned. The use of surface and air sampling is utilized in this determination, as necessary. The root cause of the spill shall be examined, and corrective steps taken to ensure the engineering and control measures in place have performed, as required. If alternative precautions or measures are needed, they are made available and implemented.

All durable equipment placed into use during clean-up activities is decontaminated for future utilization. All spill response equipment and supplies are re-stocked as required.

14.5 Fire

AECOM employees are not expected to attempt to put out fires. Stop work; notify all AECOM personnel, move upwind and contact 911 and/or emergency response at the Site. If employees have been properly trained in the

operation of a fire extinguisher, they may attempt to put out a small fire, provided that the following conditions are met:

- The fire must be small (i.e., smaller than a trash can) and in its early stages;
- The employee must have an escape route;
- The employee must be trained and know they have the right type of extinguisher;
- The employee must be safe from toxic gases; and
- There must be no hazardous conditions that could quickly accelerate the fire (i.e., presence of chemicals, especially dry grass, etc.).

Above all, if in doubt, the employee must **NOT** attempt to fight the fire.

14.6 Environmental Impacts

AECOM strives to avoid or control environmental impacts from our operations through planning and implementation of best practices as well as preparing responses to react to environmental incidents. Environmental Compliance procedure S3AM-204-PR provides details on permitting and planning requirements.

AECOM will take the appropriate steps to mitigate environmental impacts by implementing the controls listed above and addressing any spills or fires as outlined in Sections 14.4 and 14.5, respectively.

14.7 Inclement Weather

Inclement weather includes but is not limited to heavy rain or storms and associated floods, heavy winds, lightning, snowstorms and blizzards, and sandstorms and haboobs. Weather conditions which are normal or expected can cause hazards, such as cold weather in winter or excessive heat in the summer. The best approach to preventing exposure to these hazards is project planning. Where possible, plan to perform work at seasonably appropriate times of the year. Starting several days to a week prior to field work, begin reviewing projected weather forecasts to determine if work should be delayed, or accelerated, to avoid days with higher chances of inclement weather. Weather conditions can change rapidly. Therefore, field personnel and the project managers should be prepared to utilize Stop Work Authority if uncontrolled hazardous situations develop. Additional precautionary measures for reasonably foreseeable weather conditions are provided below.

14.7.1 Ambient Temperature (Heat and Cold)

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. Where possible, plan work to avoid the hottest (or coldest) part of the day. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress. Use vehicles or covered area for shelter and take breaks as needed.

14.7.1.1 Hot Weather

In hot weather and/or work area conditions, keep hydrated, prevent over exposure to the sun with clothing or use of sun cream and take frequent breaks out of the sun. Use the “buddy system” to monitor effects of heat stress as it

can be difficult to identify the impacts of heat in yourself. Create shaded work areas if appropriate. Use a strong sunscreen and wear a full-brimmed hat when in the sun to protect the back of the neck and shoulders. Refer to SH&E Procedure [S3AM-113-PR1](#), Heat Stress, for more information.

14.7.1.2 Cold Weather

In cold/wet weather and/or work area conditions, be aware of potentially slippery surfaces (wet or icy). Wear boots with good tread and carefully select your walking path to eliminate or reduce the need to traverse wet or icy surfaces. Wear warm / waterproof clothing and take breaks in a warm location. If heavy snows or icy weather are anticipated, consider your driving route prior to leaving for the Site or returning at the end of the day. It may be necessary to stop work earlier in the day to allow time to return to lodging if road conditions are at risk of deteriorating. Refer to SH&E Procedure [S3AM-112-PR1](#), Cold Stress, for more information.

14.7.2 Storms

Heavy or unexpected storms, whether they be rain, snow, or wind, represent a changed condition in which multiple hazards could be present. Stormy weather increases hazards at the job site by making travel more treacherous, both on foot and in vehicles. Visibility can be reduced. Manual tasks become more difficult as conditions worsen, increasing the chances of injury. Mental states may deteriorate increasing the risks of hazards attributable to frustration or exhaustion. Other hazards may exist; for example, winds could cause objects to blow away or strike workers or equipment or blow dust or debris into eyes. For these reasons, be aware of changing weather conditions and be prepared to stop-work to secure the project site and depart prior to storms whenever possible. If storms suddenly develop, remember that the loss of equipment or materials is far preferable to taking risks of injury by attempting to demobilize when storms are active.

14.7.3 Lightning

One of the most serious weather threats is lightning. A two-tier notification system consisting of alerts and stand downs shall be used to allow ample time for field teams to cease their activities, secure the work area, and seek shelter.

14.7.3.1 Immediate Actions – Alerts and Stand Downs

Alerts are issued by AECOM Site Supervisor and/or AECOM Site Safety Office when inclement weather, including lightning is detected within 50 miles (80 km) of the Site. Alerts indicate that work crews should be prepared to cease all field activities and secure the work area. Stand Downs are issued by AECOM Site Supervisor and/or AECOM Site Safety Officer when inclement weather is detected within 30 miles (50 km) of the work area. Stand downs indicate that all work crews shall immediately cease all field activities and seek shelter. Stand downs remain in effect until the inclement weather has passed. For thunderstorms, the stand down will remain in effect for a minimum of 30 minutes following the last detection of lightning.

14.7.3.2 Immediate Actions - Guidance for Lightning

Go Indoors: Remember the phrase, "**When thunder roars, go indoors.**" If you see lightning and cannot count to 30 before hearing thunder, the lightning is too close for comfort. Find a safe, enclosed shelter when you hear thunder. Safe shelters include homes, offices, shopping centers, and hard-top vehicles with the windows rolled up.

Crouch Close to the Ground and Separate: If you are caught in an open area, crouch down in a ball-like position (**feet and knees together**) with your head tucked and hands over your ears so that you are down low with minimal contact with the ground. **Do NOT lie down.** Lightning causes electric currents along the top of the ground that can be deadly over 100 feet away. Crouching down is the best combination of being low and touching the ground as little as possible.

Separate: If you are in a group during a thunderstorm, separate from each other. This separation will reduce the number of injuries if lightning strikes the ground.

If a person is struck by lightning:

- Call 911 or other Emergency Services Contact.
- Assess the scene to ensure that continuing risk to rescuers does not exist if lightning strikes. For other electrical-related emergencies (non-lightning), ensure the source of electricity has been deenergized.
- Check to see if the victim is breathing and proceed with CPR if victim is not breathing.

15. PERSONAL ACKNOWLEDGEMENT AND DISCLAIMER

By signing below, the undersigned acknowledges that he/she has reviewed the AECOM Health and Safety Plan for the **Kerry Chemical Company** site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work and will comply with the provisions contained therein. The employee understands that they are **NOT** to perform any work that they have not been adequately trained for and that they are to stop work if it is unsafe to proceed. Finally, the employee understands to notify the Site Supervisor and the **Incident Hotline at 800-348-5046** for any incident, **including ANY injury even if no first aid or medical treatment is required.**

Print Name	Signature	Organization	Date

15.1 Disclaimer

This HASP, and each of its provisions, is applicable only to, and for use only by, AECOM, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third-party contractors on industrial sites or projects where AECOM is providing engineering, construction management, or similar services, without the express written permission of AECOM, will be at that party's sole risk, and AECOM Corporation shall have no responsibility. The existence and use of this Plan by AECOM shall not be deemed an admission or evidence of any acceptance of any safety responsibility by AECOM for other parties unless such responsibility is expressly assumed in writing by AECOM in a specific project contract.

FIGURES

Secondary
Muster
Location



Primary
Muster
Location

Support
Zone

Contamination
Reduction
Zone

Exclusion
Zone

LEGEND

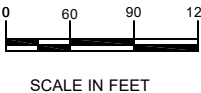
FENCE	
OVERHEAD ELECTRIC LINE	
OVERHEAD TELEPHONE LINE	
OVERHEAD CABLE T.V. LINE	
APPROXIMATE PROPERTY LINE	
WOODED AREA	
SHEET PILING	
UNITS OF SEEDING/TOPSOIL	
CULVERT PIPE	
RP-RAP	
NEW MONITORING WELL	
EXISTING MONITORING WELL	

NOTE:

- Areas to be monitored and maintained include:
- Monitoring Wells
 - Access Road
 - Culvert Under Access Road
 - Fence
 - Restored Railroad Embankment
 - Vegetated Area
 - Northern and Southern Revetments

MAP SOURCE:

- 1a. Lands of Carme S. Vitale, Jr. and James F. Vitale surveyed by David J. Beers August 1, 1991.
- 1b. Former Kerry Chemical Site, As-Built Survey, Shumaker Consulting Engineering & Land Surveying, P.C., January 3, 2008.



SCALE IN FEET

Title: SITE PLAN

Location: KERRY CHEMICAL COMPANY
APEX CADOSIA ROAD
HANCOCK, NEW YORK

Client: NYSDEC

AECOM

Drafter: DAD
Date: April 2021

Drg. Size: 11x17
Job No.: 60650103

FIGURE 11-1

ATTACHMENT **A**

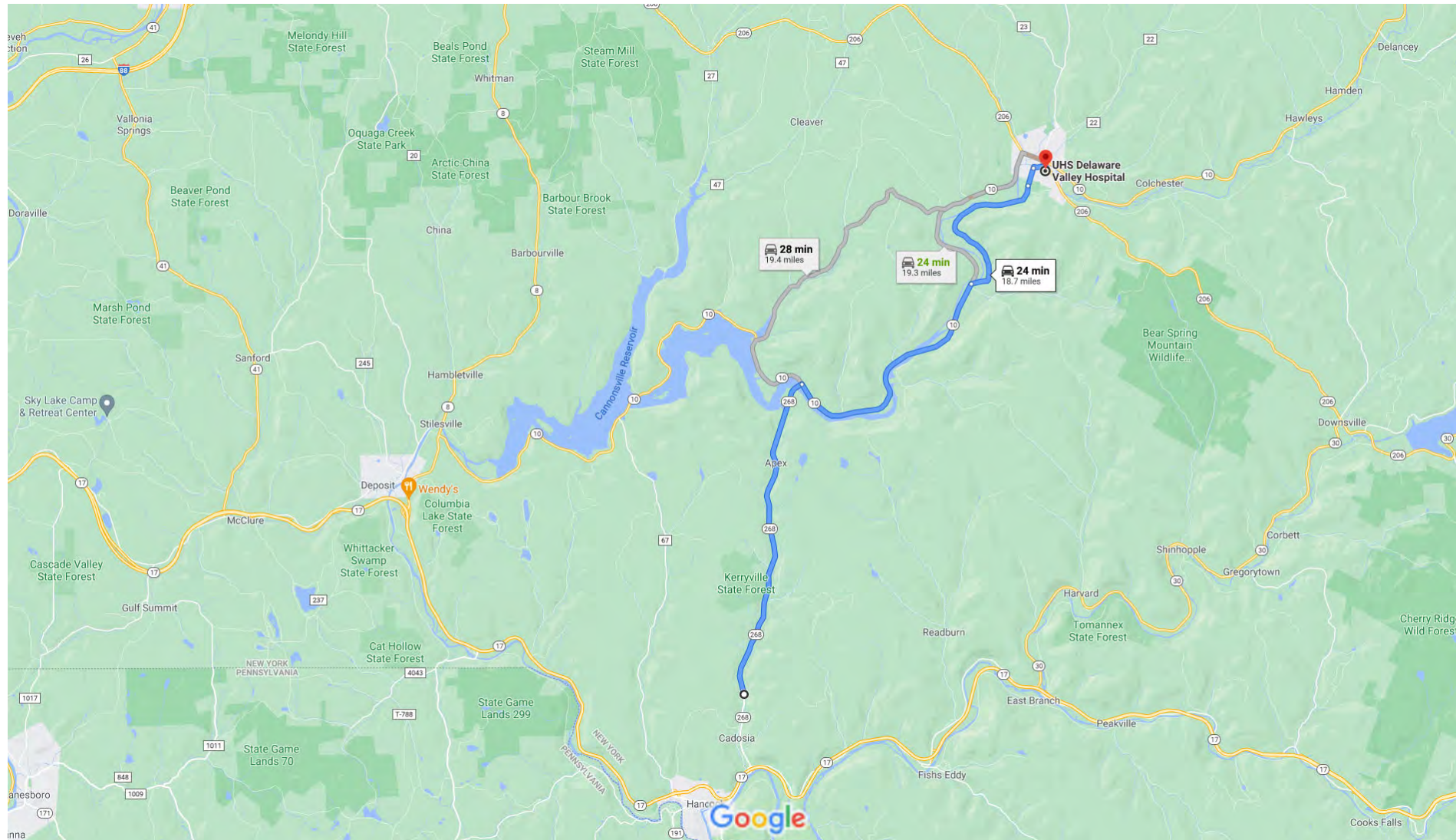
Hospital and Clinic Directions/Maps

Incident Reporting and Response Flow Chart



Hancock, New York 13783 to UHS Delaware Valley Hospital

Drive 18.7 miles, 24 min



Map data ©2021 Google 2 mi

Hancock
New York 13783

-  1. Head north on NY-268 N toward Caiati Rd
-
- 7.6 mi
-  2. Turn right onto NY-10 N
-
- 6.1 mi
-  3. Turn right onto S River Rd
-
- 4.2 mi
-  4. Continue onto South St
-
- 0.4 mi
-  5. Continue onto Stockton Ave
-
- 0.3 mi
-  6. Turn right onto Titus Pl
-  Destination will be on the right
-
- 459 ft

UHS Delaware Valley Hospital

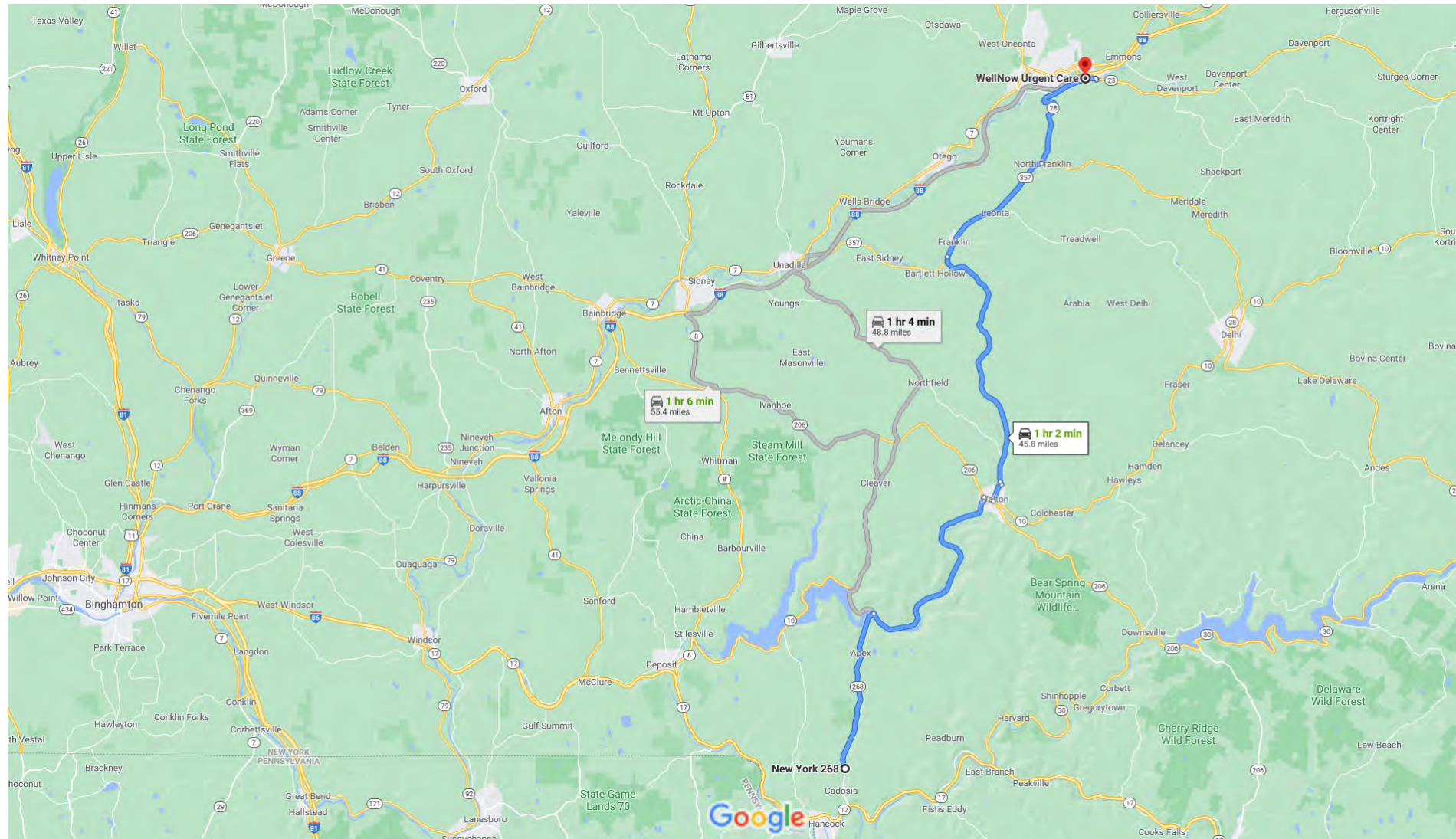
1 Titus Pl, Walton, NY 13856

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



NY-268, Hancock, NY 13783 to WellNow Urgent Care

Drive 45.8 miles, 1 hr 2 min



Map data ©2021 Google 2 mi

NY-268

Hancock, NY 13783

-  1. Head north on NY-268 N toward Caiati Rd
8 min (7.6 mi)

Follow NY-10 N to Townsend St in Walton

- 14 min (11.3 mi)
-  2. Turn right onto NY-10 N
10.9 mi
-  3. Turn right onto Delaware St
0.5 mi

Follow Franklin-Walton Rd to NY-357 E in Franklin

- 18 min (13.5 mi)
-  4. Turn left onto Townsend St
0.9 mi
-  5. Turn left onto Franklin Rd
0.1 mi
-  6. Continue onto W Brook Rd/Franklin-Walton Rd
 Continue to follow Franklin-Walton Rd
12.5 mi

Continue on NY-357 E. Take NY-28 to NY-23 W in Oneonta

- 21 min (13.3 mi)
-  7. Turn right onto NY-357 E
6.4 mi
-  8. At the traffic circle, take the 2nd exit onto NY-28
5.6 mi
-  9. At Wendy's, continue onto NY-23 E
0.7 mi
-  10. Turn right onto Lantern Hill Trailer Park
157 ft
-  11. Turn left toward Lantern Hill Trailer Park
135 ft

- 

12. Turn right toward Lantern Hill Trailer Park

108 ft
- 

13. Turn right onto Lantern Hill Trailer Park

322 ft
- 

14. Turn left onto NY-23 W

 Destination will be on the right

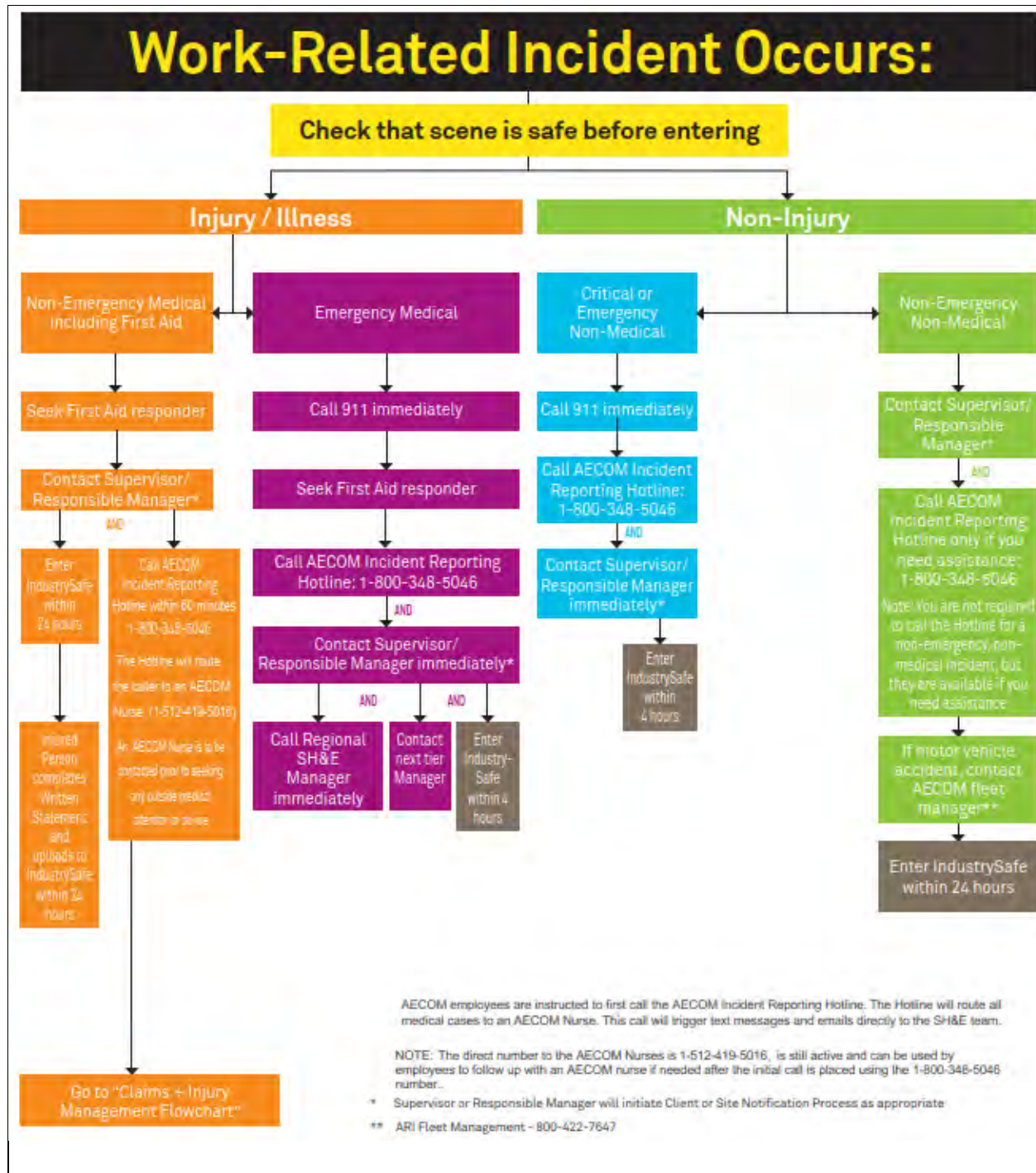
0.5 mi

WellNow Urgent Care

5001 NY-23, Oneonta, NY 13820

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

A-3: INCIDENT REPORTING AND RESPONSE FLOW CHART



ATTACHMENT **B**

Task Hazard Assessment (THA) and Tailgate Meeting Forms

Each discrete task being performed during the project (i.e., Driving, Inspection, Sample Collection, etc.) requires a Task Hazard Assessment (THA; form [S4\[DCS\]AM-209-FM6-A](#)). If you don't have a THA for a task, obtain or develop one. The [DCS Americas Templated THA Library](#) may also be used to find previously approved THAs.

The THAs MUST be reviewed at the start of each shift and signed by all staff involved in the operation. The THAs should be consulted and updated throughout the day if conditions change using the 'On-Site Edits' lines.

B-1: TASK HAZARD ASSESSMENT INSTRUCTIONS

Each unique task or work group should have their own THAs. If workers have a THA for their task(s) in hand, they should simply review it and document the site-specific edits in **red pen** in the appropriate section. If workers do **NOT** have a THA for all tasks to be performed, a THA must be obtained or drafted *prior to starting work* on that task. Use additional pages as needed.

- Identify the basic steps of the task that must be performed in order and their associated hazards. Identify controls or barriers to mitigate each identified hazard.
- Clearly identify any **STOP WORK** triggers
- Document stop work and change management if conditions/ scope changes.
- Use 4-Sight to identify and mitigate site-specific hazards throughout the day. Modify the THA as needed. Contact site supervisors or the PM for any significant scope changes or changes of expected conditions.
- All THAs shall be 3 pages (maximum) or less (preferred). If they are longer, the task is too broad.
- All hazards will use standardized nomenclature (Hazard Wheel), should be specific, detail how someone could be hurt, and what the outcome could be.
- All actions to mitigate hazards must be specific, clearly aligned with its respective hazard and not generic. Avoid words such as "proper", "correct", or "appropriate". Use specifics and numerical values (i.e., wear disposable nitrile gloves, stand back 6 feet/1.8 meters, take a 10 minute break every hour).
- PPE cannot be the only line of defense - PPE is always the last line of defense, so think through what other controls (engineering, administrative, etc.) could mitigate hazards.

Discuss as Applicable and Modify THA as Needed

Note: Check ☐ if reviewed or mark N/A

1 Biological, Chemical, Electrical, and Physical Hazards	☐ Reviewed ☐ N/A
2 Decontamination Procedures	☐ Reviewed ☐ N/A
3 Ergonomics- Lifting, Body Position	☐ Reviewed ☐ N/A
4 Lock Out/ Tag Out	☐ Reviewed ☐ N/A
5 Short Service Employees- visual identifier and mentor/ oversight assignment	☐ Reviewed ☐ N/A
6 Simultaneous/ Neighboring Operations	☐ Reviewed ☐ N/A
7 Slip/ Trip/ Fall Hazards	☐ Reviewed ☐ N/A
8 Specialized PPE Needs	☐ Reviewed ☐ N/A
9 Traffic Control	☐ Reviewed ☐ N/A
10 Waste Management/ Decontamination	☐ Reviewed ☐ N/A
11 Weather Hazards/ Heat Stress/ Cold Stress	☐ Reviewed ☐ N/A
12 Changes in Personnel, Equipment/Machinery, Methods and Materials	☐ Reviewed ☐ N/A
13 Work Permit requirements (identify):	☐ Reviewed ☐ N/A
14 Other (describe):	☐ Reviewed ☐ N/A

B-1: TASK HAZARD ASSESSMENT INSTRUCTIONS (Continued)

Using the Matrix:

1. Identify basic steps of the task and associated hazards.
2. Calculate the initial risk rating.
3. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating.
4. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	<=\$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

B-2: PROJECT TASK HAZARD ASSESSMENTS (THAs)

Task Hazard Assessment

Task Name: Field and Field Office – Precautions for Coronavirus	Control #: Rev # 6 (6/17/2020)

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):	Essential Services Letter required for travel if required by ocal ordinance	Work Location:	Apex Cadosia Road, Hancock, NY 13783		

THIS THA MUST BE FULLY REVIEWED AND ACKNOWLEDGED DAILY BY ALL AECOM STAFF and AECOM SUBS ON-SITE

All job steps, hazards, work practices & PPE are to be clearly understood and implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☐ Gloves: ☐ Hearing Protection ☐ Other: _____
	For certain tasks (see THA below) the following are required: Potable water and soap (preferable) or hand sanitizer w/ 60% alcohol Disinfectant wipes Tissues Nitrile gloves Safety goggles Coveralls Disinfectant spray List of Cleaning Products to Kill Coronavirus Face covering when you are not able to maintain 6' social distance or where required by client or government order. Face coverings can be made from household materials by using needles, thread, cloth, tee-shirts, bandanas, etc. KN95, N95, dust/face masks are also acceptable. Local requirements may vary. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html PPE Note: Consider checking sources such as gas stations and specialty markets, as these may have equipment or materials not available at general grocery stores.
Tools & Equipment:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions to Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
1. Fitness for Duty check (performed at home prior to work)	1a. Being unfit for duty – impacted by illness including coronavirus	12	1a. Ensure you are fit for duty Are you or have you been in any of these situations? ➤ I have had close contact with a confirmed case or a symptomatic person under investigation for coronavirus in the last 14 days. ➤ A doctor requested me to be tested for coronavirus or instructed me to self-quarantine? ➤ A member of my household or someone I was in close contact within the last 14 days experienced some of the following symptoms: fever, cough, shortness of breath, fatigue, sore throat, chills, gastro-intestinal disease or diarrhea, loss of taste/smell. ➤ I have or previously had some of the following symptoms in the last 7 days: fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body ache, headache, new loss of taste/smell, sore throat, congestion or runny nose, nausea or vomiting, or diarrhea..	4

Task Hazard Assessment

Task Name:	Field and Field Office – Precautions for Coronavirus	Control #:	Error! Reference source not found.

			➤ Where required, my temperature check today shows a fever, without the use of fever reducing medications in the last 24 hours? (100.4 F [37.8C] or above or exceeding criteria required by local order or client requirements). If response is a YES, then do not access the workplace. If AECOM employee, contact your Supervisor and the AECOM Nurse at 512-419-5016 for advice. If response is a NO or Yes, but released by AECOM nurse, you can proceed to work. You may be asked to check your temperature again when you arrive to your workplace.		
On-Site Edits:					
2.	Travel by vehicle or air required	2a. Being in an enclosed space with poor air circulation in close contact with other people.	12	2a. For Vehicle travel, review the “Preparations for Travel when Driving (fleet, rental and personal vehicles) to Minimize Coronavirus Exposure” THA for driving and the “Preparations for Travel when flying to Minimize Coronavirus Exposure” for flying.	4
On-Site Edits:					
3.	General Field Work	3a. Working Around Others	12	3a. Personnel must maintain at least 6-foot distance from each other (see note below if this seems to be unachievable). Practice social distancing at tailgate meetings, in break rooms and job trailers. Completely avoid (if possible) or limit the number of people in job trailers and other confined areas at any one time so that this distance can be maintained. If possible, hold meetings outside. If indoors, open window(s) for circulation. Wipe down window handles prior to opening. Even when practicing social distancing, we must limit the amount of people in any one group to less than 10 people.	4
		3b. Handling Shared Equipment and Tools	12		
				Clean all surfaces of your hands often with soap and water for at least 20 seconds. If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands, including around and under fingernails and rub them together until they feel dry. When using hand sanitizer, be sure your hands are completely dry prior to touching any objects or surfaces. Wear safety glasses or goggles and avoid contact/touching of face, eyes, nose, and mouth. Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw used tissues in the trash. Immediately wash or sanitize your hands. NOTE: . Face coverings will also be worn where clients, states or municipalities require them. If you feel your task cannot be performed by maintaining social distancing, face coverings will be worn in combination with additional behavioral or PPE controls. If additional guidance is required, contact your SH&E manager to discuss the use of additional controlsPlease keep in mind, face coverings alone will not protect you from Coronavirus, so additional controls must be added. If the need arises to enter a personal residence, prepare a separate task specific THA for this task.	

Task Hazard Assessment

Task Name:	Field and Field Office – Precautions for Coronavirus	Control #:	Error! Reference source not found.

	3c. Exposure during Lunch and Bathroom Breaks	12	3b. Wipe down and disinfect equipment before use with soap/water or disinfectant wipes. Wear disposable gloves when wiping surfaces down with disinfectant. Regularly wash hands when handling tools or equipment. Wash hands before eating or drinking.	4
	3d. Lack of food/water/supplies	4	3c. Be sure to wash hands with soap/water whenever a bathroom is nearby. At minimum, do so during bathroom and lunch breaks. Use a paper towel to open door handle when exiting bathroom. If using outside toilet facilities (i.e. Porta Johns), wash hands with soap and water or hand sanitizer both before and after opening/closing the door. Where possible, employees are encouraged to pack meals and snacks as needed for the project duration and avoid visiting stores and restaurants. If necessary, modify your schedule to avoid restaurants and public restrooms during peak, i.e., crowded, periods to minimize contact with the public. Use drive-through service for food pick-up if available. Avoid eating lunch as a group, if you must, do so outside or in a space with windows open (wipe down windows prior to opening). Maintain 6 feet or more and do not share dishes (e.g., bag of chips, communal salad bowl, etc.) Refrain from sharing a field office coffee pot. Many locations may have shortages of food, water, or supplies or closed restaurants. Bring food, water, and supplies to allow you to work a full shift without additional provisions.	1
On-Site Edits:				
4. Office Work	4a. Working around others	12	4a. Work from home when possible. Clean hands often with soap and water for at least 20 seconds after using the restroom, after you have been in a public place, before and after eating or after blowing your nose, coughing, or sneezing. If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands, including around and under fingernails, and rub them together until they feel dry. Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw used tissues in the trash. Immediately wash or sanitize your hands. Sit at least six feet apart from others. Change workstations and meeting room setup to accommodate this social distancing. Even if you are practicing social distancing, we must still limit groups of people to less than 10. Do not eat or hang out in common areas. Maintain social distancing during tailgate meetings and/or THA reviews, supervisor should seek verbal agreement from all and note this rather than passing pen and clipboard around for signature. Avoid passing round other items such as sign-in sheets as well. Make hand-sanitizers, sanitizing wipes, and other hygienic supplies readily available.	4
	4b. Encountering frequent "touch points" and handling shared equipment	12	4b. Wipe down keyboards, mouse, phone, headset/headphones, any other "touch points". Limit contact of shared items. Wipe down surfaces before contacting them. Wash hands after handling or wear disposable gloves.	4

Task Hazard Assessment

Task Name:	Field and Field Office – Precautions for Coronavirus	Control #:	Error! Reference source not found.

			In reception areas, use your own pen to sign in and out of offices. Remove unnecessary items such as business card holders, communal candy jars, etc. Work with facilities to assign someone to clean AND disinfect frequently touched surfaces daily. Follow the manufacturer's instructions for all cleaning and disinfection products (e.g., concentration, application method and contact time.	
On-Site Edits:				

Additional Notes:

Where required, supplies (i.e., disinfectant spray/wipes, soap/hand sanitizer, nitrile gloves) should be made available prior to starting work. Request re-supply if stock runs low.

Use disinfectant products that contain at least 70% alcohol. Use alcohol-based hand sanitizer that contains at least 60% alcohol. Wash hands with soap and water whenever available. Remember that soap (including bar soap) is generally available and is considered superior to hand sanitizer or disinfectant wipes/spray.

Common touch points and surfaces include but are not limited to:

- Arms on chairs
- Tabletops
- Doorknobs and handles
- Countertops
- Elevator Buttons
- Coffee Pots
- Refrigerator / microwave / dishwasher / toaster handles
- Water Dispensers
- Cabinet and file drawer knobs / handles
- Shared office supplies such as staplers, paper cutters, scissors, packaging tape dispensers, writing utensils
- Phone receivers, keypads
- Copier / printer / fax control buttons
- Sink faucets
- Light switches

Task Hazard Assessment

Task Name: Field and Field Office – Precautions for Coronavirus

Control #: Error! Reference source not found.

If any staff are showing any possible symptoms of or have been in recent direct contact with others showing symptoms of CORONAVIRUS, **STOP WORK**. Notify the site supervisor and the project manager and go home and/or stay home. Contact the AECOM Incident Reporting Hotline (1-800-348-5046) and/or the AECOM Nurse Line (1-512-419-5016), and notify the Area SH&E Manager. A list of common symptoms to look out for can be found here: [AECOM Guidance for Coronaviruses](#)
Visit the CDC webpage on cleaning and disinfecting procedures: [CDC Guidance for Community and Residential Cleaning-Disinfection for Coronavirus](#).
A list of approved disinfectants for use against SARS-CoV-2, the cause of CORONAVIRUS, is available here: [US EPA List of Disinfectants Effective Against Coronaviruses](#)

Revision Log

Version	Issued / Revised By	Date	Revision Summary
THA Revisions			
0	Amanda Lanning & Kelly Dwyer	March 23, 2020	Original version
1	Patrick Walz	March 26, 2020	Added new Step 1, Fitness for Duty Check. Modified language related to stopping work when PPE supplies are unavailable. Added instructions for making diluted bleach solution. Modified vehicle use instructions to allow long-term rental and fleet vehicle use.
2	Scott Dietz	April 2, 2020	Added new Step 5, Traveling/Out of Town Work
3	Patrick Walz & Joan Root	April 13, 2020	Modified language related to hotel stays. Moved instructions for making diluted bleach solution from PPE section to Step 6 and added hazards and mitigations. Added note regarding requirements for face coverings to PPE section, and added tips for obtaining sources of PPE.
4	Scott Dietz, Kelly Dwyer, Patrick Walz, & Devon Molitor	May 1, 2020	Added revision log. Modified language related to office cleaning to clarify that facilities should be contacted to arrange office cleaning. Modified Step 3 to clarify social distancing requirements and added “note” with steps to take when not possible.
5	Walz, Dietz, Dwyer, Indorato, Gregory, Molitor, Cooter	May 5, 2020	Modified the Fit for Duty language, removed requirement to wear nitrile gloves when driving and opening/closing doors and windows, modified language if AECOM personnel must enter a personal residence.
6	Walz, Dietz, & Shelley Brown	June 17, 2020	Modified the symptoms of coronavirus, removed language regarding travel and hotel stays and provided link to new travel THAs which cover those topics in greater detail. Various additional minor modifications to text and formatting. Modified initial risk ratings.
Project-Specific Revisions			

Task Hazard Assessment

Task Name: Field and Field Office – Precautions for Coronavirus

Control #: Error! Reference source not found.

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last-minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ▶ **What am I about to do?**
- ▶ **What can go wrong?**
- ▶ **What can be done to make it safer?**
- ▶ **What have I done to communicate the hazards?**

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



Hierarchy of Controls



- ▶ **Most hazards need more than one control**
- ▶ **What should you do? Stack your controls**
- ▶ **PPE can NEVER be your only means of protection**

Worker Sign On

I participated in the on-site review and fully understand the content of this Task Hazard Assessment.

Printed Name	Signature
1. Supervisor:	
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Visitor Acknowledgement

Visitors review task hazards and acknowledge understanding

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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com

Task Hazard Assessment

Task Name:	Field and Field Office – Precautions for Coronavirus	Control #:	Error! Reference source not found.

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

Task Name:	Preparations for Travel when Driving (fleet, rental and personal vehicles) to Minimize Coronavirus Exposure	Control #:	Rev # 1 (6/12/2020)

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

THIS THA MUST BE FULLY REVIEWED AND ACKNOWLEDGED DAILY BY ALL AECOM STAFF and AECOM SUBS ON-SITE

All job steps, hazards, work practices & PPE are to be clearly understood and implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☐ Safety Glasses ☐ HiVis Vest ☐ Safety Toe Boots ☒ Gloves: ☐ Hearing Protection ☐ Other: _____
	Additional materials and supplies required: Potable water and soap (preferable) or hand sanitizer w/ 70% alcohol Disinfectant wipes Tissues Disposable gloves Face coverings/face masks One Gallon Zip Lock Bags Safety goggles Disinfectant spray List of Cleaning Products to Kill Coronavirus
Tools & Equipment:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions to Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
1. Planning the trip	1a. Potential exposure to Coronavirus	4	1a. Map route in advance to utilize the least populated route of travel. Avoid entering public places. If traveling more than 250 miles in one direction, develop a Journey Management Plan and be sure to add controls for protection against Coronavirus.	2
On-Site Edits:				
2. Preparing vehicle for driving	2a. Possible exposure from touching contaminated surfaces, tools, equipment and materials in vehicle.	8	2a. If feasible, use your personal vehicle or procure a fleet vehicle or a rental car (contact rental car company in advance) that hasn't been driven in the past 72 hours and always clean and disinfect the vehicle in accordance with the Vehicle Cleaning THA prior to driving. If possible, park the vehicle with the windows closed facing the sun (on sunny days), to allow the vehicle to heat up for 2-3 hours.	4

Task Hazard Assessment

Task Name:	Preparations for Travel When Driving	Control #:	Error! Reference source not found. Rev # 1 (6/12/2020)

On-Site Edits:					
3.	Driving to and from destination	3a. Possible exposure from passengers	8	3a. Limit to one person per vehicle whenever possible. If a passenger must ride with you, limit to one passenger and have them sit in the rear passenger side seat. Crack and/or open windows and use fan to recirculate air.	4
On-Site Edits:					
4.	Stopping for fuel, restroom breaks and food	4a. Possible exposure due to contact with members of the general public at gas stations, convenience stores, restrooms, etc.	12	4a. Plan trip to eliminate the need to stop for food, fuel or restroom breaks. If you must stop, avoid entering public places if possible. For refueling, don face covering and disposable gloves. When finished, doff disposable gloves, dispose of in trash receptacle and wash hands with soap and water or hand sanitizer with at least 70% alcohol. If you must enter public places, practice social distancing and wear a face covering. If you must use public restrooms, don disposable gloves prior to entering, doff and dispose of in trash receptacle when exiting. Wash hands with soap and water for at least 20 seconds or use a hand sanitizer before and after entering public places and restrooms. Have soap and water, antibacterial hand wipes or spray, 70% + alcohol hand sanitizer available.	4
On-Site Edits:					
5.	Out of town work	5a. Exposure at hotels	12	5a. Where logistically feasible, if a project extends beyond a day's duration, plan on traveling home rather than staying in a hotel if this can be done within AECOM's fatigue management program. Book through CWT and in known chains to ensure maximum cleanliness, even if the hotel needs to be a further distance from the site. Call the hotel ahead of your stay to find out what controls (i.e. cleanliness, disinfection, face cover required, etc.) they have in place for their guests. If long stay, there may be other options to consider such as Airbnb (full house) to minimize contact with people. Ask for room on the first floor to avoid using the elevator if possible. Maintain social distance (minimum six feet) with people. Do not touch anything if not needed in your hotel or room as the first measure. If in doubt of cleanliness of the accommodation, bring it up to the accommodation responsible person. Wipe down all touch point surfaces in hotel room with disinfectant or alcohol wipes. Put a "do not disturb" sign on door handle to prevent hotel staff from entering room to clean during the day. If possible, open window(s) for circulation. Wipe down window handles prior to opening and use gloves to open. Refrain from using hotel room coffee machines. Wash hands frequently.	4

Task Hazard Assessment

Task Name: Preparations for Travel When Driving

Control #: Error! Reference source not found. **Rev # 1 (6/12/2020)**

On-Site Edits:					

Additional Notes:

Where required, supplies (i.e., disinfectant spray/wipes, soap/hand sanitizer, nitrile gloves) should be made available prior to starting work. Request re-supply if stock runs low.

Use disinfectant products that contain at least 70% alcohol. Use alcohol-based hand sanitizer that contains at least 60% alcohol. Wash hands with soap and water whenever available. Remember that soap (including bar soap) is generally available and is considered superior to hand sanitizer or disinfectant wipes/spray. If disinfectants are unavailable, prepare diluted bleach solution as described in Step 6 and use in their place.

If any staff are showing any possible symptoms of or have been in recent direct contact with others showing symptoms of CORONAVIRUS, **STOP WORK**. Notify the site supervisor and the project manager and go home and/or stay home. Contact the AECOM Incident Reporting Hotline (1-800-348-5046) and/or the AECOM Nurse Line (1-512-419-5016).

A list of common symptoms to look out for can be found here:

[AECOM Guidance for Coronaviruses](#)

Visit the CDC webpage on cleaning and disinfecting procedures: [CDC Guidance for Community and Residential Cleaning-Disinfection for Coronavirus](#)

A list of approved disinfectants for use against SARS-CoV-2, the cause of CORONAVIRUS, is available here: [US EPA List of Disinfectants Effective Against Coronaviruses](#)

Revision Log

Version	Issued / Revised By	Date	Revision Summary
THA Revisions			
0	Scott Dietz	June 1, 2020	Original version
1	Scott Dietz	June 12, 2020	Added "Out of town work"

Task Hazard Assessment

Task Name:	Preparations for Travel When Driving	Control #:	Error! Reference source not found. Rev # 1 (6/12/2020)

Project-Specific Revisions			

Task Hazard Assessment

Task Name: Preparations for Travel When Driving

Control #: Error! Reference source not found. **Rev # 1 (6/12/2020)**

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last-minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ▶ **What am I about to do?**
- ▶ **What can go wrong?**
- ▶ **What can be done to make it safer?**
- ▶ **What have I done to communicate the hazards?**

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



Hierarchy of Controls



- ▶ **Most hazards need more than one control**
- ▶ **What should you do? Stack your controls**
- ▶ **PPE can NEVER be your only means of protection**

Worker Sign On

I participated in the on-site review and fully understand the content of this Task Hazard Assessment.

Printed Name	Signature
1. Supervisor:	
2.	
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Visitor Acknowledgement

Visitors review task hazards and acknowledge understanding

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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com

Task Hazard Assessment

Task Name:	Preparations for Travel When Driving	Control #:	Error! Reference source not found. Rev # 1 (6/12/2020)

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

Task Name: Coronavirus Vehicle Cleaning THA	Control #: Rev # 1 (6/1/2020)

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

THIS THA MUST BE FULLY REVIEWED AND ACKNOWLEDGED DAILY BY ALL AECOM STAFF and AECOM SUBS ON-SITE

All job steps, hazards, work practices & PPE are to be clearly understood and implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☒ Safety Glasses ☐ HiVis Vest ☐ Safety Toe Boots ☒ Nitrile ☐ Hearing Protection Gloves: ☐ Other: See list below _____
	Disposable gloves, in proper size for operator(avoid latex due to allergy concerns) Face coverings or mask Safety Glasses
Tools & Equipment:	Paper towels Trash container/bags Safety glasses Small bucket of water Dish soap Disinfectant spray or wipes List of Cleaning Products to Kill Coronavirus
	Note: Many of the same household cleaners (such as non-bleach, unscented, non-chlorinated disinfectant cleaners and wipes) that kill coronaviruses on hard surfaces at home can also clean most car interiors without causing damage. Alcohol solutions that contain at least 70 percent alcohol are effective against coronavirus, according to the CDC. Nearly every interior surface of a vehicle can be cleaned with isopropyl alcohol. Vigorous washing with soap and water can also destroy the coronavirus. Soap and water are safe for most car interiors. Warning! • Don't use bleach or hydrogen peroxide on the inside of the vehicle. • Don't use scented wipes or wipes containing bleach. • Don't use ammonia-based cleaners on car touch screens or dashboards, as they can damage anti-glare and anti-fingerprint coatings. • Never combine cleaning chemicals as doing so may lead to toxicity. • If using alcohol, avoid any potential source of sparks/ignition. DO NOT SMOKE!

Task Hazard Assessment

Task Name: Coronavirus Vehicle Cleaning THA

Control #: Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions to Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
1. Plan for cleaning/disinfecting		1a. Exposure to harsh disinfectants	8	1a. Read the Safety Data Sheet or warnings/precautions on the label. Wear the PPE specified. At a minimum, gloves and safety glasses shall be worn.	4
		1b. Not having the supplies necessary to perform the task (inadequate cleaning)	8	1b. Confirm that you have the necessary supplies and equipment before proceeding. If possible, prepare a supply kit with all necessary cleaning/disinfecting prior to travel.	4
		1c. Damaging vehicle interior surfaces	8	1c. Consult the owners manual to verify how to clean the various surfaces. Some surfaces may be adversely impacted by certain cleaners and by an excess application of water.	4
	On-Site Edits:				
2. Prepare the vehicle for cleaning		2a. Inadequate cleaning because of obstructed surfaces	6	2a. Don gloves and safety glasses. Open all vehicle doors and remove all trash, water bottles, tools, equipment, etc., that are not part of the vehicle. Clean or discard as appropriate.	4
	On-Site Edits:				
3. Inspect the vehicle and clean if necessary		3a. Insufficient cleaning due to excessively soiled surfaces	8	3a. Inspect the vehicle interior for any visibly soiled surfaces. If these are identified, clean those surfaces with a few drops of dish detergent in a bucket of water using a clean cloth.	4
		3b. Damaging electronics	6	3b. Avoid using excess water onto the surfaces	4
	On-Site Edits:				
4. Disinfect frequent touch points (see Additional Notes section for list)		4a. Accidental transfer of coronavirus to others.	8	4a. Disinfect all frequently touched surfaces using the disinfectant identified. Consult the Additional Notes section for a list of surfaces to be considered.	4
		4b. Improperly applying disinfectant and ruining vehicle surfaces	10	4b. Test on small, inconspicuous surface first. Apply disinfectant in accordance with the instructions. Avoid excessive application.	4
	On-Site Edits:				

Task Hazard Assessment

Task Name:	Coronavirus Vehicle Cleaning THA	Control #:	Error! Reference source not found.

	4c. Eye, skin, or inhalation exposure to disinfectant	10	4c. Apply disinfectant in accordance with the directions. Wear PPE as required.	4
On-Site Edits:				
5. Hold time	6a. Eye, skin or lung irritation from residual disinfectant	8	6a. Keep the vehicle doors open for 10-15 minutes after disinfecting to allow the vehicle to air out. If possible, park the vehicle with the windows closed facing the sun (on sunny days), to allow the vehicle to heat up for 2-3 hours.	2
	6b. Frequent changeover of vehicles	8	6b. To the extent feasible, all vehicles should have a 72-hour wait/hold time between different drivers. Currently, the Coronavirus is believed to survive up to 72 hours on certain hard surfaces. Waiting 72-hours further minimizes the risk of exposure.	4
On-Site Edits:				

Additional Notes:

Surfaces can be a source of COVID-19 exposure and sharing vehicles can result in different people touching the surfaces of the vehicle. Vehicles should be cleaned and disinfected **before use, after use, and when changing drivers.** The cleaning should be conducted by the **vehicle operator.** Cleaning supplies shall be stored in each vehicle to allow for periodic cleaning before and after use and during the day, as needed.

Common touch points and surfaces on vehicles include but are not limited to the following:

- Center console
- Dashboard surface
- Glove box,
- Inside door handles
- Keys/key fob
- Outside door handles
- Overhead console
- Parking brake handle

Task Hazard Assessment

Task Name: Coronavirus Vehicle Cleaning THA

Control #: Error! Reference source not found.

- Rear view mirror
- Seat belts buckles
- Seat control
- Shift lever
- Steering wheel
- Sun visors
- Radio controls
- Touch screens

If any staff are showing any possible symptoms of or have been in recent direct contact with others showing symptoms of CORONAVIRUS, **STOP WORK**. Notify the site supervisor and the project manager and go home and/or stay home. Contact the AECOM Incident Reporting Hotline (1-800-348-5046) and/or the AECOM Nurse Line (1-512-419-5016).

A list of common symptoms to look out for can be found here:

[AECOM Guidance for Coronaviruses](#)

Visit the CDC webpage on cleaning and disinfecting procedures: [CDC Guidance for Community and Residential Cleaning-Disinfection for Coronavirus](#)

A list of approved disinfectants for use against SARS-CoV-2, the cause of CORONAVIRUS, is available here: [US EPA List of Disinfectants Effective Against Coronaviruses](#)

Revision Log

Version	Issued / Revised By	Date	Revision Summary
THA Revisions			
1	Lisa Rygiel	June 1, 2020	Original version
Project-Specific Revisions			

Task Hazard Assessment

Task Name:	Coronavirus Vehicle Cleaning THA	Control #:	Error! Reference source not found.

Task Hazard Assessment

Task Name: Coronavirus Vehicle Cleaning THA

Control #: Error! Reference source not found.

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last-minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ▶ **What am I about to do?**
- ▶ **What can go wrong?**
- ▶ **What can be done to make it safer?**
- ▶ **What have I done to communicate the hazards?**

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



Hierarchy of Controls



- ▶ **Most hazards need more than one control**
- ▶ **What should you do? Stack your controls**
- ▶ **PPE can NEVER be your only means of protection**

Worker Sign On

I participated in the on-site review and fully understand the content of this Task Hazard Assessment.

Printed Name	Signature
1. Supervisor:	
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Visitor Acknowledgement

Visitors review task hazards and acknowledge understanding

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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com

Task Hazard Assessment

Task Name:	Coronavirus Vehicle Cleaning THA	Control #:	Error! Reference source not found.

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

Task Name:	Driving to and From Site	Control #:	01-01-12-02

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/30/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☐ Safety Glasses ☐ HiVis Vest ☐ Safety Toe Boots ☐ Gloves: _____ ☐ Hearing Protection ☐ Other: _____ Leather / Nitrile _____				
Tools & Equipment:	Emergency kit Communication device (cell phone) Navigation system				

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk (initial)	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk (final)	
1. Trip Planning	1a. Unauthorized driving	9	1a. You must be an AECOM authorized driver to drive for AECOM business purposes. Consult the requirements of S3AM-005-PR1. Authorized Drivers shall maintain a current driver's license with full privileges applicable to the vehicle to be operated. Develop a Journey Management Plan if applicable.	4	
	1b. Inclement weather	6	1b. Evaluate weather conditions prior to beginning the travel to determine if travel should proceed. Verify your vehicle is equipped to travel in poor weather. Have supplies on hand in the event that you become stranded, including a communication device to call for help.	4	
	1c. Getting Lost	6	1c. Review route in advance and program GPS prior to leaving	3	
	1d. Inadequate vehicle for the site/trip	7	1d. Understand what type of vehicle is necessary to transport tools & equipment to the site. Know site conditions before departure and obtain proper vehicle, 4-Wheel drive if necessary	4	
	1e. Vehicle malfunction	8	1e. Inspect vehicle prior to leaving. Verify that maintenance records are current.	4	
On-Site Edits:					
2. Driving	2a. Fatigue	15	2a. Start trip well rested & take breaks when needed. Share driving responsibilities where possible. STOP DRIVING AND PULL OVER in a safe place if you begin nodding off or showing other signs of fatigue.	4	

Task Hazard Analysis

Task Name:	Driving to and From Site	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
	2b. Risky driving practices	15	2b. Practice defensive driving techniques and avoid bad driving habits - Allow for adequate time to make the trip - Do not speed or attempt to multi-task - Do not use cell phone or text or attempt to program GPS while driving	4
On-Site Edits:				
3. Stops/breaks during transit	3a. Theft of equipment/materials	6	3a. Place any likely theft items out of sight and lock vehicle when leaving it. Do not leave vehicle unattended for longer than necessary. If at all possible, avoid leaving packed vehicles in public parking areas overnight, unload if possible. Park in well lighted areas.	4
	3b. Personal security risk	10	3b. Be alert and aware of surroundings when making stops. Stop at areas which are well lit and have security if possible.	3
On-Site Edits:				
4.	4a.		4a.	
On-Site Edits:				

Additional Notes:

Task Hazard Assessment

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

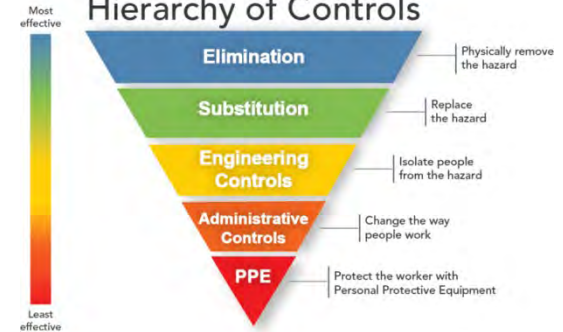
Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ▶ **What am I about to do?**
- ▶ **What can go wrong?**
- ▶ **What can be done to make it safer?**
- ▶ **What have I done to communicate the hazards?**

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



Hierarchy of Controls



- ▶ **Most hazards need more than one control**
- ▶ **What should you do? Stack your controls**
- ▶ **PPE can NEVER be your only means of protection**

Worker Sign On	
<i>I participated in the on-site review and fully understand the content of this Task Hazard Assessment.</i>	
Printed Name	Signature
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Visitor Acknowledgement
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Task Hazard Assessment

Task Name:	Gauging Liquid Levels in Groundwater Monitoring Wells	Control #:	01-01-05-07

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: <u>Leather, nitrile</u> ☐ Hearing Protection ☐ Other: _____				
Tools & Equipment:	Hand Tools	Liquid level/Interface probe	Decon materials		

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk (initial)	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk (final)
1. Visually clear proposed gauging locations	1a. Exposure to biologic hazards: insects, poisonous plants and animals. Injuries could include anaphylactic shock, allergic reaction, rabies	6	1a. Identify and avoid hazardous plants and animals on site. Look for signs (spider webs, droppings, etc.). Wear cut resistant gloves, insect repellant; use a broom or a rake to move vegetation, not your hand or foot; move slowly	4
	1b. Damage to equipment or vehicles due to surface / subsurface obstructions	6	1b. Investigate travel path. Look for surface obstructions such as rubble, debris, old foundations or rebar. Use spotter is available or park in such a manner as to not have to back-up.	4
	1c. Slips / trips / falls due to uneven terrain resulting in broken bones or torn ligaments.	6	1c. Identify, mark and avoid slip, trip and fall hazards (holes, obstructions protruding from the ground, or debris). Contact PM immediately and do not proceed if any conditions are observed that cannot be controlled to make well gauging in the area safe.	4
	1d. Struck by vehicle resulting in severe trauma or death	10	1d. Visually inspect roadway for moving equipment if walking and set up vehicle as a barrier if driving. Set up exclusion zone around each well. Don reflective vest	4
On-Site Edits:				
2. Opening well casings / flush-mount covers and well plug lock	2a. Cuts / lacerations / crushing, bruises	6	2a. Avoid touching sharp materials/ edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers, and feet clear when opening and closing well cover. Inspect ground before kneeling, d on knee pads.	2
	2b. Back strain	4	2b. Stretch before working. DO NOT use awkward positioning. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2

Task Hazard Analysis

Task Name:	<u>Gauging Liquid Levels in Groundwater Monitoring Wells</u>	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
	2c. Vapor exposure resulting in inhalation hazards or illness 2d. Biologic hazards: insects, poisonous plants, and animals	4 6	2c. Stand upwind from the well opening to avoid vapor exposure. Loosen well cap slowly, keeping control if pressure is released due to vapors. Keep face out of line-of-fire. 2d. Slowly lift the well cover away from person and look for insects underneath the well. Use long handle tool to remove or kill any insects (i.e. screwdriver).	2 4
On-Site Edits:				
3. Lowering fluid meter probe and measuring tape to detect fluid level and total depth	3a. Cuts / lacerations / bruises to knees (flush mount) 3b. Aches and strains from repetitive motion 3c. Exposure to chemical hazards in groundwater resulting in skin irritation or illness	4 4 3	3a. Inspect ground before kneeling. Remove any objects. Don knee pads 3b. Do not use awkward positioning. Keep back straight, take regular rest/stretch breaks. Change position regularly. 3c. Use smooth movements to avoid splashes. Don nitrile gloves over cut resistant gloves and safety glasses with side shields. Check gloves for damages/ rips.	2 2 2
On-Site Edits:				
4. Removing fluid meter measuring tape and probe from well	4a. Exposure to chemical hazards in groundwater resulting in inhalation hazard or illness 4b. Cross contamination of equipment 4c. Cuts / lacerations / bruises to knees (flush mount) 4d. Aches and strains from repetitive motion 4e. Trips / falls from entanglement in measuring tape	4 4 4 4 3	4a. Stay upwind to avoid vapor exposure. 4b. Clean the tape and probe using non-phosphate soap and distilled water. Wipe with clean paper towel. Collect decontamination materials for waste disposal. Wear disposable nitrile gloves. 4c. Don knee pads and inspect ground before kneeling down and take frequent breaks to stand and stretch. 4d. See Step 3b. 4e. Check for location of measuring tape before walking or moving around.	2 2 2 2 2

Task Hazard Analysis

Task Name:	<u>Gauging Liquid Levels in Groundwater Monitoring Wells</u>	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!						
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>	
On-Site Edits:						
5.	Closing well casings / flush-mount covers	5a. Cuts / lacerations / crushing / bruises	4	5a. Avoid touching sharp materials/ edges. Keep face, hands, fingers, and feet clear when opening and closing well cover. Don knee pads and inspect ground before kneeling down.	2	
		5b. Back strain from heavy / awkward materials handling	4	5b. Keep back straight. Take regular rest/stretch breaks. Change position regularly. * Verify that well covers are secure upon departure.	2	
On-Site Edits:						
6.	Gather gauging equipment and tools, place in work vehicle	6a. Cuts / lacerations / crushing / bruises from gathering or dropping equipment	3	6a. Maintain a secure grip on equipment and only carry manageable amount of equipment when demobilizing.	2	
		6b. Aches and strains from improper lifting	4	6b. Bend and lift with legs. Keep back straight. Take regular rest/ stretch breaks. Change position regularly. Team lift is required for items over 50 lbs. (or awkward items). * Verify all tools and equipment are removed from the site.	2	
On-Site Edits:						

Additional Notes:

Task Hazard Analysis

Task Name: Gauging Liquid Levels in Groundwater Monitoring Wells

Control #: Error! Reference source not found.

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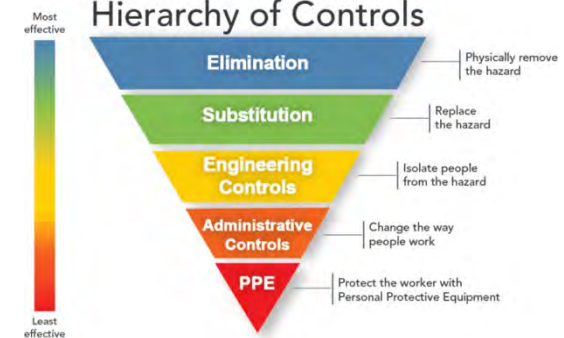
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Hierarchy of Controls



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Printed Name	Signature
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Visitors review task hazards and acknowledge understanding

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Task Hazard Analysis

Task Name:	<u>Gauging Liquid Levels in Groundwater Monitoring Wells</u>	Control #:	Error! Reference source not found.

Include a copy of the new THA or a photo of the THA modifications as appropriate.

AECOM Imagine it.
Delivered.

1 of 6

Task Hazard Analysis

Task Name:	Groundwater Sampling – Bailer	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
		poisonous plants, and animals		Use long handle tool to remove or kill any insects (i.e. screwdriver).	
On-Site Edits:					
3.	Purge monitoring well	3a. Exposure to site contaminants causing health issues or irritation/dermatitis	6	3a. Bail slowly with controlled motions. Obtain a firm grasp on the bailer which may be slick with water and the presence of LNAPL. Wear appropriate PPE (i.e., eye protection, long pants, nitrile sampling gloves, shirt with sleeves, steel-toed boots).	2
		3b. Hand laceration from cutting bailing string	6	3b. When cutting bailing string to attach to bailer, cut away from the body, not towards. Use scissors or a cutting tool with a protected blade such as a safety knife. Wear a minimum of cut resistant level 2 gloves.	2
		3c. Repetitive motion injury from bailing purge water	6	3c. Take frequent breaks as needed to prevent fatigue to shoulder and arm muscles caused by bailing water. Be aware of pain, tingling or loss of feeling associated with repetitive stress injuries and report all symptoms immediately.	4
On-Site Edits:					
4.	Sampling well	4a. Exposure to chemical hazards in groundwater resulting in inhalation hazard or illness	4	4a. Stay upwind to avoid vapor exposure. Do not splash purged water on clothing or skin. Maintain a firm grasp on the bailer which may be slick with water and the presence of LNAPL. Wear appropriate PPE (i.e., eye protection, long pants, nitrile sampling gloves, shirt with sleeves, steel-toed boots).	2
		4b. Burns to the skin/eyes from contact with sample preservatives	4	4b. Avoid contact with preservatives (HCl, HNO ₃ , and H ₂ SO ₄). These are commonly corrosive and can burn the skin/eyes on contact. Cut resistant level 2 and nitrile surgical gloves should be worn when opening a cooler and retrieving sample collection containers as sample preservative may have leaked from a container or multiple containers.	2
		4c. Cuts to the hand from chipped/broken bottleware	6	4c. Inspect bottleware for cracks and chips. When closing glassware, close lid without exerting strong pressure. Keep hands separated when closing VOA vials (hold bottom of vial and close lid with fingertips of other hand). Wear cut resistant level 2 gloves beneath nitrile surgical gloves.	2

Task Hazard Analysis

Task Name:	Groundwater Sampling – Bailer	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
On-Site Edits:					
5.	Closing well casings/flush mount covers	5a. Cuts/ lacerations/crushing, bruises	4	5a. Avoid touching sharp material/edges. Wear cut resistant level 2 gloves. Keep face, hands, fingers feet clear when closing well cover. Don knee pads and inspect ground before kneeling down.	2
		5b. Back strain from heavy/awkward material handling	4	5b. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2
On-Site Edits:					
6.	Gather sampling equipment and tools, place in work vehicle	6a. Cuts/crushing/bruises from gathering or dropping equipment	3	6a. Maintain a secure grip on equipment and only carry manageable amount of equipment when demobilizing. Wear cut resistant or leather gloves	2
		6b. Aches and strains from improper lifting	4	6b. Bend and lift with legs. Keep back straight. Take regular rest/stretch breaks. Change position regularly. Team lift is required for items over 50 lbs. (or awkward items).	2
On-Site Edits:					
7.		7a.		7a.	
On-Site Edits:					

Task Hazard Analysis

Task Name:	Groundwater Sampling – Bailer	Control #:	Error! Reference source not found.

Additional Notes:

Task Hazard Analysis

Task Name:	Groundwater Sampling – Bailer	Control #:	Error! Reference source not found.

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

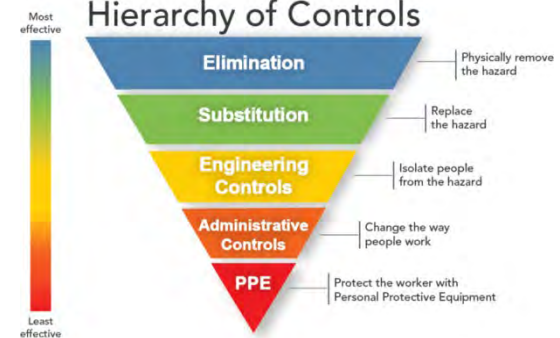
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Hierarchy of Controls



- ▶ **Most hazards need more than one control**
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Worker Sign On	
<i>I participated in the on-site review and fully understand the content of this Task Hazard Assessment.</i>	
Printed Name	Signature
1. Supervisor: Katie Scott	
2. Stuart Bell	
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Visitor Acknowledgement	
<i>Visitors review task hazards and acknowledge understanding</i>	
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Task Hazard Analysis

Task Name:	Groundwater Sampling – Bailer	Control #:	Error! Reference source not found.

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

Task Name:	Groundwater Sampling – Low Flow	Control #:	01-01-05-12

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile, cut resistant _____ ☐ Hearing Protection ☐ Other: _____				
Tools & Equipment:	Hand tools	YSI	Pump		

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>	On-Site Edits:
1. Visually clear proposed sampling locations	1a. Exposure to biological hazards: insects, poisonous plants and animals. Injuries could include anaphylactic shock, allergic reactions, rabies.	6	1a. Identify and avoid hazardous plants and animals on site. Look for signs (spider webs, droppings, etc.). Wear cut resistant gloves, insect repellant, use a broom or a rake to move vegetation, not your hand or foot, move slowly	4	
	1b. Slip/trips, falls due to uneven terrain resulting in broken bones or torn ligaments.	6	1b. Identify, mark and avoid slip, trip and fall hazards (holes, obstructions protruding from ground, or debris). Contact PM immediately and do not proceed if any conditions are observed that cannot be controlled to make well sampling in the area safe.	4	
	1c. Struck by vehicle resulting in severe trauma or death	10	1c. Visually inspect roadway for moving equipment if walking and set up vehicle as a barrier if driving. Set up exclusion zone around each well. Don reflective vest.	4	
2. Open well casing/flush-mount covers and well plug lock.	2a. Cuts/lacerations/crushing, bruises	6	2a. Avoid touching sharp material/edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers, and feet clear when opening and closing well cover. Inspect ground before kneeling. Don knee pads.	2	
	2b. Back strain from improper lifting	4	2b. Stretch before working. DO NOT use awkward positioning. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2	
	2c. Vapor exposure resulting in	4	2c. Stand upwind from the well opening to avoid vapor exposure. Loosen well cap slowly, keeping control if pressure is released due to vapors. Keep face out of line-of-fire.	2	

Task Hazard Analysis

Task Name:	Error! Reference source not found.	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
		inhalation hazards or illness 2d. Biologic hazards; insects, poisonous plants, and animals	6	2d. Slowly lift the well cover away from person and look for insects underneath the well. Use long handle tool to remove or kill any insects (i.e. screwdriver).	4
On-Site Edits:					
3.	Installing tubing in well and setting up equipment.	3a. Cuts/lacerations/crushing, bruises	6	3a. Avoid touching sharp material/edges. Keep face, hands, fingers feet clear when cutting tubing and setting up equipment. Wear cut resistant ANSI 2 gloves with disposable nitrile over gloves	2
On-Site Edits:					
4.	Removing tubing from well	4a. Exposure to chemical hazards in groundwater resulting in inhalation hazard or illness 4b. Cuts/lacerations/bruises to knee (flush mount)	4 4	4a. Stay upwind to avoid vapor exposure 4b. Don knee pads and inspect ground before kneeling down and take frequent breaks to stand and stretch	2 2
On-Site Edits:					
5.	Closing well casings/flush mount covers	5a. Cuts/ lacerations/crushing, bruises 5b. Back strain from heavy/awkward material handling	4 4	5a. Avoid touching sharp material/edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers feet clear when closing well cover. Don knee pads and inspect ground before kneeling down. 5b. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2

Task Hazard Analysis

Task Name:	Error! Reference source not found.	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
On-Site Edits:					
6.	Gather sampling equipment and tools, place in work vehicle	6a. Cuts/lacerations/crushing/bruises from gathering or dropping equipment 6b. Aches and strains from improper lifting	3 4	6a. Maintain a secure grip on equipment and only carry manageable amount of equipment when demobilizing. 6b. Bend and lift with legs. Keep back straight. Take regular rest/stretch breaks. Change position regularly. Team lift is required for items over 50 lbs (or awkward items)	2 2
On-Site Edits:					
7.		7a.		7a.	
On-Site Edits:					

Additional Notes:

Task Hazard Analysis

Task Name: Error! Reference source not found.

Control #: Error! Reference source not found.

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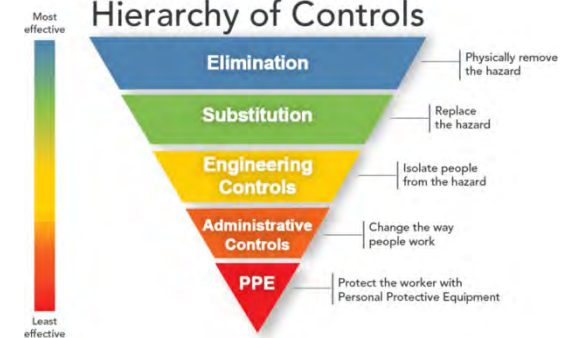
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For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



Hierarchy of Controls



- ▶ **Most hazards need more than one control**
- ▶ **What should you do? Stack your controls**
- ▶ **PPE can NEVER be your only means of protection**

Worker Sign On

I participated in the on-site review and fully understand the content of this Task Hazard Assessment.

Printed Name	Signature
1. Supervisor:	
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Visitor Acknowledgement

Visitors review task hazards and acknowledge understanding

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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com

Task Hazard Analysis

Task Name:	Error! Reference source not found.	Control #:	Error! Reference source not found.

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

Task Name:	Load and Unload Vehicle	Control #:	01-01-12-04

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: High vis mechanix style gloves ☐ Hearing Protection ☐ Other: _____
Tools & Equipment:	Hand truck or dolly

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>	
1. Load & Unload Vehicle	1a. Sprains/strains/overexertion 1b. Pinch points between load and vehicle or between load items 1c. Slips/trips/falls 1d. Nicks and cuts from equipment edges	8 10 10 6	1a. To minimize the risk: - Use dollies, carts, come-alongs, or rollers whenever possible rather than the employee physically moving materials. - Use proper lifting techniques by bending and lifting with legs and not back, and do not over extend or twist. Do not lift over 49 lbs. without assistance. Seek assistance when needed and know your lifting limit - Minimize distance needed to move materials and stage loading and unloading areas as close as possible. 1b. Know where your hands and other people's hands are at all times. Wear high vis gloves as a reminder. Avoid placing fingers under load while positioning. Use caution with tailgates and vehicle doors, especially under windy conditions. 1c. Inspect and clear walking path prior to beginning loading. Do not stack loads that impair visibility. 1d. Inspect materials and equipment for rough edges and burrs. Wear cut resistant gloves.	4 4 4 4	
On-Site Edits:					

Task Hazard Analysis

Task Name:	Load and Unload Vehicle	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>		Risk <i>(initial)</i>	
		Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>		Risk <i>(final)</i>	
2. Secure & cover exposed loads	2a. Line of fire hazards from straps/bungee cords	15		4	
	2b. Load shift in transit	10		4	
	2c. Theft of tools & equipment	8		4	
On-Site Edits:					
3.	3a.			3a.	
On-Site Edits					
4.	4a.			4a.	

Task Hazard Analysis

Task Name:	Load and Unload Vehicle	Control #:	Error! Reference source not found.

Additional Notes:

Task Hazard Analysis

Task Name: Load and Unload Vehicle

Control #: Error! Reference source not found.

All Employees:

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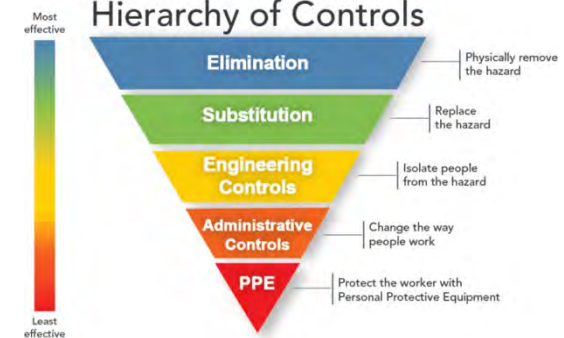
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Task Hazard Analysis

Task Name:	Load and Unload Vehicle	Control #:	Error! Reference source not found.

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Analysis

Task Name:	Monitoring Well Abandonment – Grout	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
2. Mix grout		2a. . Injury to back or strain from lifting and mixing and moving equipment	8	2a. .Lift with legs and not back. Do not reach or twist when lifting. Make sure you have a clear path to where you are going before you carry heavy objects over distance	4
		2b. Inhalation of airborne particulates	4	2b. Stay upwind and wear dust mask while mixing grout. Pour grout slowly.	2
		2c. Hand injury from tools used to open bags	6	2c. Use scissors or safety cutters to open grout bags. Fixed open blade knives are not allowed to be used. Cut away from yourself and others. Inspect tools prior to use. Use cut-resistant gloves.	4
		2d. Eye or skin irritation from contact with grout	4	2d. Use tools to mix grout. Add water slowly to avoid splashing. Wear safety glasses and chemical-resistant gloves.	2
On-Site Edits:					
3. Fill well annulus or perforated well with grout		3a. . Eye or skin irritation from contact with grout	4	3a. . Avoid contact with grout. Wear safety glasses and chemical-resistant gloves.	3
		3b. Contact injury from pressurized hose or tremie pipe failure	6	3b. Inspect hose connections for wear and damage prior to pressurization and pumping grout. Inspect tremie pipe at connections and verify that there are no obstructions in tremie pipe prior to pumping grout. Wear safety glasses and chemical resistant gloves.	2
		3c. Slips, trips, and falls due to obstructions and slippery work area conditions	6	3c. Maintain clean work area free from trip hazards, such as hoses intersecting walking paths. Clean up any splashed or spilled grout immediately.	3
On-Site Edits:					

Task Hazard Analysis

Task Name:	Monitoring Well Abandonment – Grout	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
4.	Debris handling and disposal	4a. . Cuts and abrasions and pinch points during debris handling	6	4a. . Note pinch points and sharp edges on concrete, well vaults, protective casings, metal skirts, and bollard debris and avoid. Don leather gloves	4
		4b. . Ergonomic Injury from lifting heavy objects	8	4b. Stretch before working. Bend at knees and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds	4
On-Site Edits:					
5.	Site restoration	5a. Ergonomic Injury from lifting heavy bagged materials	8	5a. Inspect bags prior to lifting and carrying heavy bags of topsoil, concrete, or asphalt patch material. Stretch before working. Bend at knees and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds	4
		5b. Injury or property damage from stepping or driving into open holes or fresh fill areas	6	5b. Restore areas as soon as practical to avoid leaving open holes. Use traffic control devices, as needed, to prevent vehicles or pedestrians from contact with open holes or newly restored areas	3
		5c. Contact with patch materials and dust	4	5c. Avoid creating and breathing dust. Pour from upwind side of hole. Open bag and pour slowly in well ventilated area. Wear goggles/spoggles and leather gloves when handling materials	2
On-Site Edits:					

Additional Notes:

Task Hazard Analysis

Task Name: Monitoring Well Abandonment – Grout

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All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

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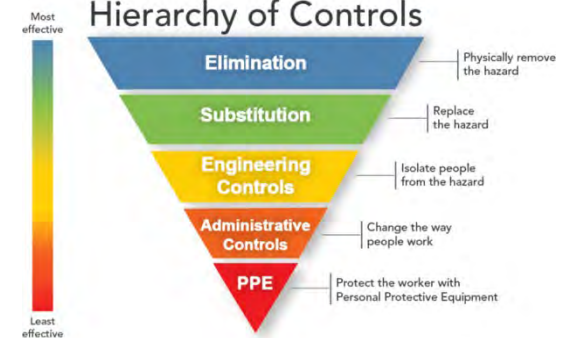
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Hierarchy of Controls



- ▶ **Most hazards need more than one control**
- ▶ **What should you do? Stack your controls**
- ▶ **PPE can NEVER be your only means of protection**

Worker Sign On

I participated in the on-site review and fully understand the content of this Task Hazard Assessment.

Printed Name	Signature
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Task Hazard Analysis

Task Name:	Monitoring Well Abandonment – Grout	Error! Reference source not found.

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

Task Name:	Site Walk – General Site Visit	Control #:	01-01-10-06

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: leather ☒ Hearing Protection ☐ Other: PPE for expected weather conditions				
Tools & Equipment:	camera	notebook/pen			

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>		Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	
		Risk (initial)			Risk (final)
1. Plan the site walk	1a. Personal injury from not having proper PPE	4	1a. Determine what the basic PPE requirements are in advance and have available or know that they will be available to you to borrow once on site.		4
	1b. Vehicle getting stuck or damaged due to terrain/site conditions	4	1b. Determine what type of vehicle is needed for site conditions (4-wheel drive, truck or car).		4
	1c. Heat/cold stress, insect bites, sunburn from inadequate materials/supplies	4	1c. Determine what materials and supplies you must bring versus what is available on site such as insect spray, sunscreen, drinking water, food, etc.		4
	1d. Lack of site escort if needed	4	1d. Prearrange trip in advance where possible, determine who will be meeting you on site and when.		4
	1e. Inclement weather	6	1e. Plan for the anticipated weather conditions. Check the predicted weather for the worksite prior to departing. Reschedule site visit if severe weather such as lightning storms, sleet/ice storms, blizzards, etc., are predicted.		2
On-Site Edits:					
2. Arriving at site	2a. Getting stuck or sustaining slip/trip/fall injuries from parking in inappropriate areas	6	2a. Know where you are supposed to park prior to arrival or check in at site. Park in an area with firm, level surface, and with a good surface (avoiding wet/muddy conditions, poor walking surfaces, etc) available when you exit the vehicle.		2

Task Hazard Assessment

Task Name:	Error! Reference source not found. Site Visit	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
	2b. Injuries from being struck due to 3 rd party or client operations	10	2b. Park that you do not subject yourself or your vehicle to site hazards such as construction vehicle traffic, forklifts or other equipment, passing motorists, etc.,	2
On-Site Edits:				
3. Walking Site/Observing Work	3a. Biological hazards	4	3a. There are many different types of biological hazards that can be encountered on a work site. These include ticks, spiders, mosquitoes, chiggers, poisonous or other noxious plants, alligators, bears, small mammals, bird droppings, small mammals, snakes, etc. Do not attempt to pick up, handle, or otherwise handle stray or wild animals such as dogs, cats, raccoons, squirrels, etc., no matter how tame they may appear.	2
	3b. Slips/trips/falls	4	3b. Be aware of walking surfaces at all times, wear footwear with good tread and ankle support, use handrails where available, avoid walking in muddy or wet areas when possible, identify and mark or have removed any obstructions that may be present in predicted walking paths.	2
	3c. Crossing roads, bridges, etc	6	3c. Keep to pathways appropriate for pedestrian traffic – sidewalks, walkways with handrails, etc. If no sidewalk is present, stay off the side of the shoulder, behind guardrails where possible, etc. Walk facing traffic. Never take photographs while walking to reduce risk of inadvertently wandering into traffic.	3
On-Site Edits:				
4. Leaving the site	4a. Transporting biological hazards into vehicle	4	4a. Inspect self for ticks before entering vehicle. If it possible that clothing and personal items such as jackets, backpacks, lunch bags, and so on have been exposed to poisonous plant oils or may harbor ticks or other insects, bag such items until they can be appropriately treated.	2
	4b. Hitting object when leaving causing vehicle or property damage	6	4b. Before moving the vehicle, perform a 360° walk around of the vehicle to verify that no changes have been made that may impact exit.	4

Task Hazard Assessment

Task Name:	Error! Reference source not found. Site Visit	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
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On-Site Edits:					
5.		5a.		5a.	
On-Site Edits:					
6.		6a.		6a.	
On-Site Edits:					
7.		7a.		7a.	
On-Site Edits:					

Additional Notes:

Task Hazard Assessment

Task Name:	Error! Reference source not found. Site Visit	Control #:	Error! Reference source not found.

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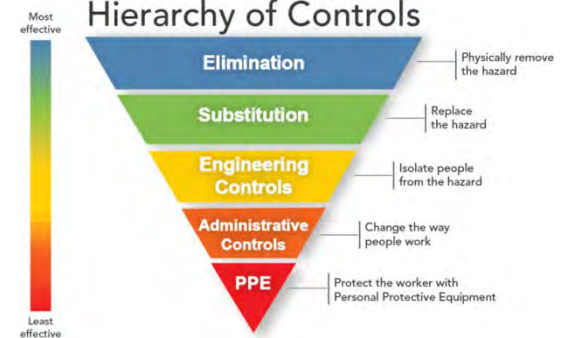
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Hierarchy of Controls



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Worker Sign On	
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Task Hazard Assessment

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B-3: BLANK THA AND DAILY TAILGATE MEETING FORMS

Task Hazard Assessment – DCSA

Task Name:	Error! Reference source not found. Click here to enter text.	Control #:	Error! Reference source not found. Click here to enter text.

Project Name:	Kerry Chemical Company, Site Management	Client:	NYSDEC	Date:	4/27/2021
Permits Required? (list):		Work Location:	Apex Cadosia Road, Hancock, NY 13783		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: _____ ☐ Hearing Protection ☐ Other: _____
Tools & Equipment:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>		Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
1.		1a.		1a.	
On-Site Edits:					
2.		2a.		2a.	
On-Site Edits:					
3.		3a.		3a.	

Task Hazard Assessment – DCSA

Task Name: Error! Reference source not found. Click here to enter text.	Control #: Error! Reference source not found. Click here to enter text.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!					
	Job Steps <i>List all steps required to perform a task in the sequence they are performed</i>	Potential Hazards <i>How could you be hurt? What would the injury be?</i>	Risk <i>(initial)</i>	Critical Actions To Mitigate Hazards <i>List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact. Identify any 'Stop Work' triggers.</i>	Risk <i>(final)</i>
On-Site Edits:					
4.		4a.		4a.	
On-Site Edits:					
5.		5a.		5a.	
On-Site Edits:					
6.		6a.		6a.	
On-Site Edits:					
7.		7a.		7a.	
On-Site Edits:					

Task Hazard Assessment – DCSA

Task Name:	Error! Reference source not found. Click here to enter text.	Control #:	Error! Reference source not found. Click here to enter text.

Additional Notes:

Task Hazard Assessment – DCSA

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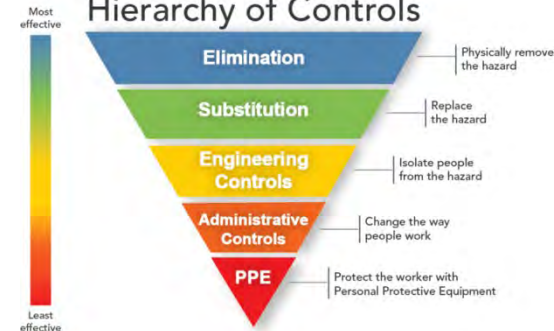
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Task Hazard Assessment – DCSA

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Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation.** Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name:

Phone Number:

AECOM SH&E Rep. Name:

Phone Number:

Meeting Leader:

Date:	Project Name/Location: NYSDEC, Kerry Chemical	Project Number: 60650103

Today's Scope of Work:

Muster Point Location: Site Entrance	First Aid Kit Location: In Vehicle	Fire Extinguisher Location: NA	Spill Kit Location: NA

1. Required Topics	2. Discuss if Applicable to Today's Work
☒ Fitness for Duty requirements, all sign in / sign out ☒ Required training (incl. task specific) completed and current ☒ SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.) ☒ Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting ☒ STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA ☒ Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition ☒ Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location ☒ Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all ☒ Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified ☒ Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public ☒ Required checklists/records available, understood (describe): ☒ Lessons Learned / SH&E improvements (describe):	☒ ☐ Check ☒ as reviewed or mark ☐ as not applicable ☐ ☐ Biological/ Chemical / Electrical Hazards ☐ ☐ Ergonomics - Lifting, Body Position ☐ ☐ Lock Out/ Tag Out Short Service Employees - visual identifier and mentor/ oversight assignment ☐ ☐ Simultaneous/ Neighboring Operations ☐ ☐ Slip/ Trip/ Fall Hazards ☐ ☐ Specialized PPE Needs ☐ ☐ Traffic Control ☐ ☐ Waste Management/ Decontamination ☐ ☐ Weather Hazards / Heat Stress / Cold Stress ☐ ☐ Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.) ☐ ☐ Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach): ☐ ☐ Other Topics (describe/attach): ☐ ☐ Client specific requirements (describe):

3. Daily Check Out by Site Supervisor	
Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	Signature	Date Time (at end of day / shift)

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

Daily Tailgate Meeting (S3AM-209-FM5)

Revision 9 January 15, 2019

PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.

4. Daily Check for COVID-19		
Question	Yes	No
Is social distancing being practiced?		
Are hand sanitary/wipes available for project team?		
Are tail gate safety meetings held outdoors?		
Are remote/call in job meetings held?		
Is PPE (i.e. gloves, masks, eye protection) being used?		
Are field cleaning/disinfection practices being implemented?		
Are workers/visitors excluded based on close contact with individuals diagnosed with COVID-19, recent travel to restricted areas or countries, symptomatic (fever, chills, cough/shortness of breath)?		
Does any worker have a temperature of >100.4° F, persistent cough or shortness of breath? If so, describe actions taken: _____		

All employees:

- **STOP WORK** if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

- * The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
- * The hazards & control measures associated with each task you are about to perform.
- * The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
- * That no tasks or work is to be performed without a hazard assessment.
- * Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

- * You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
- * You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
- * You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
- * You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

ATTACHMENT C

AECOM SH&E Procedures

All AECOM SH&E Procedures, in their controlled copy version, are available on the internal SH&E Policy and Procedures ecosystem page.

Programmatic procedures referenced in this document (for example SH&E Training) **DO NOT** need to be printed for inclusion in this HASP. Only procedures that are needed for field activity reference and application **MUST** be printed in full and included in this section.

Hazard/ Activity (Note: Text in this column links to procedure)	Site Specific Description (Where, What Phase of Work, Frequency, Etc.)	Applicable Procedure
☒ Bloodborne Pathogens	First Aid Providers	S3AM-111-PR
☒ Cold Stress	Continuous exposure when ambient air temperature is below 32 °F (0 °C) or when ambient air temperature is below 50 °F (10 °C) with wet/damp conditions.	S3AM-112-PR
☒ Corrosive Reactive Materials	Handling pre-preserved bottles for sampling	S3AM-125-PR
☒ Hand and Power Tools	Accessing monitoring wells	S3AM-305-PR
☒ Heat Stress	Continuous exposure when ambient air temperature is above 80 °F (26.6 °C) <u>and</u> a standard work uniform is worn or when ambient air temperature is above 70 °F (21.1 °C) <u>and</u> impermeable chemical protective clothing is worn.	S3AM-113-PR
☒ Non-Ionizing Radiation	Frequent exposure to sunlight during daylight hours	S3AM-121-PR
☒ Pandemic Virus	Potential exposure during travel and field task(s)	SR1-003-PR2
☒ Wildlife, Plants and Insects	Working outside, exposed to plants/wildlife,	S3AM-313-PR
☒ Working on and Near Water	Well decommissioning	S3AM-315-PR

Pandemic Procedure

SR1-003-PR2

1. Purpose and Scope

Providing the requirements for preparation and planning for potential pandemic emergencies that may occur while AECOM staff are working.

Applies to all AECOM staff working inside and outside an AECOM office, including location and project environments as well as business related travel.

2. Background

2.1 Pandemic

A pandemic virus emerges because of a process called antigenic shift, which causes an abrupt or sudden and major change in flu-like viruses. Public health officials closely monitor the movement of flu-like viruses through avian and swine populations. The public health fear is that the virus may obtain the ability to shift and incorporate the ability to infect humans directly through human-to-human contact. At that point, the threat of a regional epidemic, or a global pandemic may be realized.

Flu-like viruses can weaken the immune system, making the person more vulnerable to serious infections such as pneumonia, or can worsen chronic medical conditions. Public health officials watch both avian and swine flu outbreaks closely to monitor potential for an antigen shift and progression to a human transmissible disease.

Government health agencies continually monitor flu-like viruses and other diseases worldwide. Human cases are reported and updated by the World Health Organization (WHO) and U.S. Centers for Disease Control (CDC). This information is used by responsible government agencies for planning and response actions as required to minimize the spread and effects of disease outbreaks. It is important that information provided by CDC or WHO is made available to employees when there is potential for impact on work conditions or local community health.

2.1.1 Swine Influenza

Influenza A (H1N1) is a flu virus of swine origin that first caused illness in March and April, 2009. Influenza A (H1N1) flu spreads in the same way that regular seasonal influenza viruses spread, mainly through the coughs and sneezes of people who are sick with the virus, but it may also be spread by touching infected objects and then touching your nose or mouth. Influenza A (H1N1) is now established in human populations as a seasonal influenza virus. There is an Influenza A vaccine available for humans.

2.1.2 Avian Influenza

Avian influenza (bird flu) occurs mainly in wild birds but can spread to domestic birds and can cause outbreaks. Human cases are rare but have occurred from direct close contact with infected birds and poultry or contaminated materials. There is no vaccine available for humans related to this virus at this time.

2.1.3 Coronavirus

Coronavirus (COVID-19) is the result of a virus identified as SARS-CoV-2. Coronaviruses are large family of viruses found in both animals and humans. Some infect people and are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) with symptoms such as fever, cough and shortness of breath. There currently is no human vaccine available for this virus.

2.2 Flu-Like Contingency Planning

2.2.1 Roles & Responsibilities of Governing Agencies

2.2.1.1 Global Health Monitoring

The WHO coordinates health issues for the United Nations and provides leadership on global health matters. The WHO assists member nations with recommendations regarding global pandemics and declares global pandemic phases to help organizations to plan for the impacts. The major phases are:

a. Phase 1:	No viruses circulating among animals have been reported to cause infections in humans.
b. Phase 2:	An animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.
c. Phase 3:	An animal or human-animal flu-like reassortment virus (the process by which viruses swap gene segments) has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver.
d. Phase 4:	There is verified human-to-human transmission of an animal or human-animal flu-like reassortment virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed, and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.
e. Phase 5:	There is human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
f. Phase 6:	The pandemic phase is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.
g. Post-peak period:	During the post-peak period, pandemic disease levels in most countries with adequate surveillance will have dropped below peak observed levels. The post-peak period signifies that pandemic activity appears to be decreasing; however, it is uncertain if additional waves will occur and countries will need to be prepared for a second wave.
h. Post-pandemic period:	Flu-like disease activity will have returned to levels normally seen for seasonal flu-like illness. At this stage, it is important to maintain surveillance and update pandemic preparedness and response plans accordingly. An intensive phase of recovery and evaluation may be required.

2.2.1.2 Country Specific Pandemic Plans

Most nations have developed pandemic plans that include monitoring the regional spread of disease, the recommended medical practices, and related guidance. AECOM operations outside the US must keep abreast of country specific requirements and recommendations.

2.2.1.3 United States

The federal government is responsible for coordinating a nationwide flu-like pandemic response.

- a. The U.S. Department of Homeland Security coordinates all non-medical support and response actions.

- b. The Department of Health and Human Services (HHS) coordinates overall public health and medical emergency response. Under Executive Order 13295 (revised April 1, 2005), the Secretary of Health and Human Services has the authority for apprehension, detention and conditional release of individuals to prevent the spread of a flu-like illness caused by a novel or re-emergent flu-like virus that causes or has the potential to cause a pandemic. Under HHS, the CDC is responsible for controlling the introduction and spread of infectious diseases and provides information to help health care providers, public health officials and the public. CDC's Division of the Strategic National Stockpile (SNS) distributes antiviral drugs, personal protective equipment, and respiratory protection devices to all 50 states and U.S. territories to help them respond to outbreaks.
- c. Under the Department of Defence (DOD) Directive 6200.3, military facilities require identification of a Public Health Emergency Officer who coordinates Military Treatment Facilities emergency response plans with local emergency planning.

2.2.1.4 State and Local Governments

Each state has authority to manage and respond to pandemic conditions. It is important that projects and offices contact their local and state governments for emergency contact information.

3. Procedure and Responsibilities

AECOM Managers, HR (Human Resources), SH&E (Safety, Health and Environment) including Occupational Health, Legal Counsel, and Resilience Coordinators will collaborate and drive efforts to plan for, respond to, manage and recover from pandemic disruption to the business. This collaboration may also require input and cooperation from various other support functions who should be consulted in a timely fashion in order to expedite a return to normal business operations or to provide alternate solutions such as remote work. In the event of a declared Stage 5 or Stage 6 of a Pandemic event, the AECOM Managers, HR, SH&E, Occupational Health, Legal Counsel and Resilience Coordinators will make decisions and take necessary steps to protect the business from the pandemic, up to, and including, travel bans to/from certain areas, telecommuting, and other decisions as needed for business continuity with a focus on the health and welfare of the employee. Local Resilience Teams will take the lead in responding to pandemic-related business disruptions with overarching guidance provided by Global Resilience.

3.1 Corporate Roles and Responsibilities

AECOM offices will be prepared to respond to either a global, national or regional pandemic condition in accordance with the Organizational Resilience Standard - AECOM Global. The standard provides the common platform to organize mission-critical, Resilience Teams to prepare for, actively navigate and / or recover from significant business disruptions. It also provides the context for plans and procedures to minimize any impact on AECOM's business in terms of severity and duration.

3.1.1 Prevention and Containment

- a. If a pandemic condition exists or is imminent within a local office or field location, consult the location specific Emergency Response Plan (ERP) or Business Continuity Plan for immediate response guidelines.
- b. Upon notification from State Emergency Planning agency that a national or regional pandemic condition exists or is reasonably expected to occur, the facilities and administration teams working with the SH&E Department will provide sufficient and accessible infection control supplies in all local affected business locations in keeping with AECOM's [Infectious Disease and Pandemic Cleaning Instruction - AECOM Global](#).
- c. Face masks may be supplied, if recommended by WHO/CDC. Supplies of anti-viral medications will not be stockpiled, distributed, or administered unless specified by community health administrators.
- d. Annual influenza vaccinations are encouraged.

- e. As applicable, communications through email or intranet, training programs, or work place postings may be utilized to provide information concerning prevention and containment. Information may include, but is not limited to:
 - i. Initial symptoms of the disease, disease prevention techniques, how to respond if an individual suspects infection and when return to work is appropriate after the illness.
 - ii. Personal practices and habits for minimizing exposure, such as: frequent hand washing, avoiding exposing other employees when sick, annual flu vaccinations if appropriate, and consulting a personal physician to determine personal risk.
 - iii. Social distancing techniques such as minimizing large group gatherings, reducing employee face-to-face meetings through the use of video / phone conferencing/ Microsoft Teams, and eliminating unnecessary travel during severe outbreaks.
- f. Flexible worksite and flexible work hours options should be implemented as appropriate.
- g. Employees shall notify their supervisor if they are going to miss work because of illness. Information concerning sick leave and health benefits can be obtained through the employee's HR representative, by consulting applicable policies and procedures specific located on the [AECOM Integrated Management Systems \(IMS\) platform](#), and through [MyHR](#).
- h. As applicable, business and meeting travel may be limited to "business essential" only.
- i. Management will notify any applicable clients or suppliers of potential business impacts that may be experienced as a result of a pandemic. Management will update clients/suppliers once operations are restored to full capacity.

3.1.2 Anti-Viral Medication

- a. Media coverage of flu-like outbreaks has focused on the availability of oral anti-viral medications (not vaccines). These prescription medications are known to help with treating uncomplicated flu-like virus effects in limited applications. There are potential side effects of the drugs, and some viruses have shown resistance to the drug.
- b. Based on this information, unless legally mandated by a country's government, AECOM will not attempt to stockpile sources of anti-viral drugs to be used for employees in the event of a pandemic. Resources of these drugs may be maintained by a country's National Strategic Stockpile.
- c. Employees should contact their personal health care provider regarding recommendations for support medications that may be necessary in the event of a flu pandemic.

3.2 General AECOM Employee Guidelines

3.2.1 Employee Illness

- a. Employees should report the illness to your Supervisor immediately.
- b. Employees who are ill with flu-like symptoms (Fever >100.4 F/38 C, cough, shortness of breath) should stay home. If they have a fever, they should stay home until at least 24 hours after they are free of fever without the use of fever reducing medications.
- c. Employees should not travel if they are ill.
- d. Employees who become sick during work hours should immediately go home.
- e. Employees at higher risk of complications, or who become seriously ill, should contact their health care provider immediately.

3.2.2 Employee Family Member Illness

- a. Employees who are well but who have a family member at home with the flu may choose to stay home or can go to work as usual. Employees with ill family members should monitor their health daily before coming to work and stay home if they become ill.
- b. Employees who choose to stay home to care for ill family members should contact their supervisor or HR representative to discuss flu-related issues such as using sick time/paid time off or if telecommuting is an option.
- c. Employees should not bring an ill family member with them to the office, even for brief periods.

3.2.3 Supervisors

- a. If an employee calls in sick because of the flu or a flu-like illness, the supervisor is to advise them to stay home. Expect employees to be out of work for 3-5 days (in most cases). Additional quarantine may be required based on the recommendations of CDC / WHO.
- b. Should the supervisor be informed by the employee that he/she has the flu or flu-like symptoms, the supervisor should report the employee illness to HR and SH&E representative only, maintaining the employee's privacy.
- c. Because symptoms may not appear until after an incubation period, (24 hours prior to symptoms), the supervisor should try to account for any close contacts (3ft/1m for 30 minutes) the affected employee might have had in order to evaluate if co-workers may have been exposed. Report the potential exposure of co-workers to your HR or SH&E representative.
- d. Do not allow employees with the flu or flu-like symptoms to remain at work. In-office quarantine (isolation) of an employee with flu-like symptoms (e.g., work in a secluded office area) is not permitted.

Important Reminder: The names of employees who are ill with the flu are **CONFIDENTIAL** and can only be discussed with HR representatives or company nurses.

3.2.4 HR or SH&E Representatives

- a. During Phase 5 and 6 of a potential / actual Pandemic, the SH&E representative will track cases of flu illness at your location using the Coronavirus Affected Employee Form obtained from the AECOM Occupational Health Nurse and submit to nurse@aecom.com upon identification of employee/s who are confirmed positive for the virus, exhibiting symptoms of the virus or on self-quarantine and provide updates at least weekly. These numbers also to be reported to your Local Resilience Coordinator (LRC) to allow Resilience Teams (RT) to assess appropriate responses in accordance with the [Disruptive Event Response Instruction - AECOM Global](#). Each state/country has specific resilience reporting contacts located on the [Global Resilience Team contact list](#).
- b. Inform fellow employees if a co-worker possibly exposed them to a flu-like illness, while maintaining strict confidentiality regarding the identity of the co-worker, so that employees can self-monitor for symptoms and stay home if they become sick. (Sample notification: We have been notified that there has been a potential exposure to the coronavirus in this office/building. As a precaution, it is recommended that all employees potentially affected begin self-monitoring for symptoms and to stay home if you become ill. Ensure that you follow the office procedure for notification of management of unexpected absences). For additional information, refer to the AECOM Global update through the Ecosystem
- c. A medical release of a clearance to return to work (following an extended absence) may not be available because of a busy health care system. Requiring a physician's release to return to work should be considered in cases of hospitalization or medical leave of absence in line with local HR protocols.
- d. Address staff rumours immediately through investigation and follow-up, then inform management of communication with employee and onward reporting to the Local Resilience Coordinator.

3.2.5 HR Representative

- a. Advise employees and supervisors regarding sick time or paid time off options.
- b. Discuss with supervisors if telecommuting is an option for the employee.

3.2.6 Managers/SH&E Representative

- a. Provide information to staff regarding good hygiene, including cough and sneeze etiquette and proper hand washing. Hold periodic meetings to refresh awareness of prevention measures.
- b. Remind employees to check with their health care provider to determine if flu inoculations are recommended.
- c. Follow-up with facilities and office managers to provide tissues, disinfectant wipes, hand sanitizers and no-touch receptacles for disposal.
- d. Coordinate with facilities managers to arrange for commonly touched surfaces such as doorknobs and countertops to be cleaned frequently in accordance with AECOM's [Infectious Disease and Pandemic Cleaning Instruction - AECOM Global](#).

3.3 Travel Worldwide to Areas Affected by a Pandemic

AECOM's Global Security & Resilience (GSR) shall be consulted to obtain advice, approvals or restrictions, and support, for employees traveling worldwide to and returning from areas affected by a pandemic or potential pandemic. Travel to high risk locations as defined by the [Country Risk Score Index](#) will also require approval. AECOM's [Corporate guidance can be found on the Ecosystem](#) and is updated weekly.

Persons visiting areas with reports of outbreaks of concern can reduce their risk of infection by observing the following measures:

3.3.1 Before Traveling to an Affected Area

- a. Educate yourself and others who may be traveling with you through consultation with AECOM's GSR Travel Security Portal ([Drum Cussac](#)) and AECOM's policies and procedures located on the [AECOM Integrated Management Systems \(IMS\) platform](#).
- b. Confirm applicable and routine vaccinations are current. See your doctor or health-care provider, or (for employees) follow the international business and travel requirements on the [International Travel Procedure](#). When traveling from the US, contact our travel resource, WorkCare Travel Consultant directly at 800-455-6155 and outside the US, contact iSOS (International SOS) at +1 215 942 8226 (Membership # 11BMMS000147), ideally 4-6 weeks before travel, to get any additional vaccination medications or information you may need. In many cases, a medical examination may be required prior to travel.
- c. Assemble a travel health kit containing basic first aid and medical supplies. Be sure to include a thermometer and alcohol-based hand gel or wipes for hand hygiene. See the [AECOM Travel Health- Pack Smart Checklist](#).
- d. Identify in-country health-care resources in advance of your trip. Employees may contact iSOS, HR or WorkCare for assistance in identifying available resources.

3.3.2 During Travel to an Affected Area

- a. As with other infectious illnesses, one of the most important preventive practices is careful and frequent hand washing for at least 20 seconds. Cleaning hands often with soap and water removes potentially infectious material from skin and helps prevent disease transmission. Waterless alcohol-based hand gels or wipes may be used when soap is not available, and hands are not visibly soiled.

- b. If an employee becomes sick with symptoms such as a fever accompanied by cough and sore throat, or difficulty breathing or if they develop any illness that requires prompt medical attention, a consular officer (refer to the country's representatives on the GSR Travel Portal-Drum Cussac) or iSOS can assist you in locating approved medical services and informing your family or friends. The employee should defer any further travel until they are free of symptoms, unless traveling locally for medical care or instructed to evacuate by your project management, security, or upon advice of occupational health nurses. AECOM employees on foreign travel should notify their HR representative of any serious illness. Local employees should contact their supervisor according to their specified reporting policy.
- c. In the event of a flu outbreak, avoid all direct contact with birds or swine and avoid farms and markets. There is the possibility that other animal groups may become reservoirs of the infection in the future so current information from WHO/CDC should be checked for updated guidance.

3.3.3 After Return from Travel

- a. Monitor your health for 14 days after return for any fever or breathing difficulties.
- b. If you become ill with a fever plus a cough and sore throat, or trouble breathing during this 14-day period, consult your primary care physician. Do not come into work until advised by your primary care physician that it is safe to do so. Communicate the following:
 - i. your symptoms;
 - ii. where you travelled; and
 - iii. if you have had direct contact with animals, birds, or severely ill persons.
- c. Do not travel while ill, unless you are seeking medical care. Limiting close physical contact (<3ft/1 meter) with others as much as possible can help prevent the spread of an infectious illness.

4. Help & Training

The following resources provide an overview of AECOM's Organizational Resilience framework and process (titles also available at AECOM University).

- a. [Global Resilience Team Framework](#)
- b. [Organizational Resilience: Redefining What's Possible](#)
- c. [Powering Organizational Resilience through Functional Readiness](#)
- d. [Resilience Coordinator Overview](#)
- e. [Resilience Readiness: Disruptive Event Guidance](#)

5. Terms and Definitions

a.	Local Resilience Coordinator	A manager designated as the Office or Worksite lead for local level organizational resilience who may or may not be the emergency response coordinator. The LRC is the point of contact with the Region Resilience Team in determining further action, including notifications, following an initial emergency response.
b.	Pandemic	An epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people as declared by the World Health Organization

- c. Resilience Team (RT) Interdependent networks of necessary and essential business functions collaborating at the enterprise, region and/or local levels to achieve organizational resiliency. Functions include but are not limited to communications, facilities, finance, human resources (HR), information technology, legal, procurement, safety, health, and environment, and security. Refer to the [Organizational Resilience Standard - AECOM Global](#)

6. References

This procedure forms a sub-set of AECOM's overall Organizational Resilience framework and should be read and executed as such. This procedure is to be applied in conjunction with the following Procedures and Instructions.

- a. [Organizational Resilience Standard - AECOM Global – SR1-003-PR1](#)
- b. [Disruptive Event Response Instruction - AECOM Global – SR1-003-WI2](#)
- c. [Infectious Disease and Pandemic Cleaning Instruction – AECOM Global - SR1-003-WI4](#)
- d. [S2-001-ATT6 Potential Coronavirus Exposure Management and Reporting](#)

7. Appendices

The following appendices are designed to assist business leads, people managers, HR partners, SH&E representatives and Resilience Coordinators assess processes to follow when presented with potentially symptomatic employees, visitors, locations and provide useful resources for communicating prevention methods in the workplace.

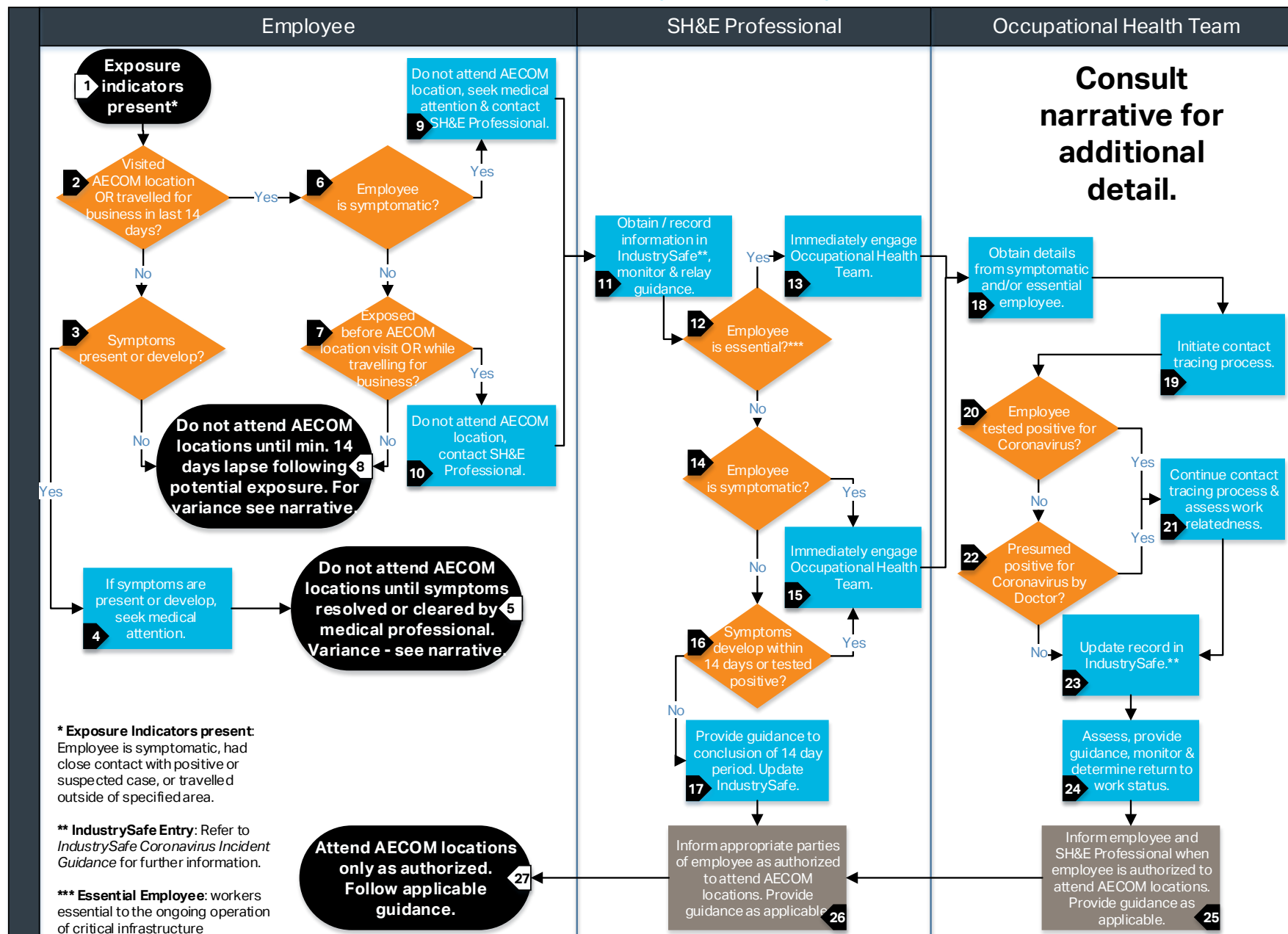
- a. Appendix 1 – Potential Coronavirus Exposure Management and Reporting
- b. Appendix 2 – Virus Prevention Posters and Flyers

8. Change Log

Rev #	Change Date	Description of Change	Location of Change
0	March 11, 2020	Initial Release as SR1-003-PR2	
1	March 20, 2020	Former Appendix 1 (Manager Resilience Checklist) removed. Pandemic Response Flowchart revised and inserted as Appendix 1.	Appendix 1
2	July 30, 2020	Replaced Pandemic Response Flowchart with Potential Coronavirus Exposure Management and Reporting. Added reference S2-001-ATT6 Potential Coronavirus Exposure Management and Reporting	Appendix 1 AND 6.d.

Appendix 1 Potential Coronavirus Exposure Management and Reporting

Consult [S2-001-ATT6 Potential Coronavirus Exposure Management and Reporting](#) for additional detail.



Appendix 2 Virus Prevention Posters & Flyers



Wash your hands

Wash your hands with
soap and running water
when **hands are visibly
dirty**



If your **hands are not
visibly dirty**,
frequently clean them
by using alcohol-based
hand rub or soap and
water



Protect yourself and others from getting sick

Wash your hands



- after coughing or sneezing
- when caring for the sick
- before, during and after you prepare food
- before eating
- after toilet use
- when hands are visibly dirty
- after handling animals or animal waste



STAY HEALTHY WHILE TRAVELLING

**If you become sick
while travelling,
inform crew and
seek medical care
early**



**If you seek medical
attention, share travel
history with your health
care provider**



World Health
Organization

STAY HEALTHY WHILE TRAVELLING

**Avoid travel if you have
a fever and cough**



**If you have a fever, cough and
difficulty breathing seek medical
care early and share previous
travel history with your health
care provider**



World Health
Organization

Bloodborne Pathogens

S3AM-111-PR1

1.0 Purpose and Scope

- 1.1 Define the AECOM procedures for eliminating and/or controlling occupational exposure to Bloodborne Pathogens on AECOM projects and activities.
- 1.2 A written Exposure Control Plan shall be developed and implemented during all AECOM operations where there is a reasonable potential for occupational exposure of AECOM employees and/or subcontractors to bloodborne pathogens as a regulated waste.
- 1.3 This procedure's requirements apply to all AECOM Americas employees and operations and any other entity and its personnel contractually required to comply with this document's content. Any jurisdictional requirements exceeding those identified in this procedure shall be met when conducting work in the given jurisdiction.

2.0 Terms and Definitions

- 2.1 **Blood** – Human whole blood; human blood components such as plasma or platelets; and human blood products such as clotting factors.
- 2.2 **Bloodborne Pathogens (BBP)** – Pathogenic microorganisms that are present in human blood and that can infect and cause disease in persons who are exposed to blood containing these pathogens including but not limited to hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, malaria, syphilis, babesiosis, brucellosis, leptospirosis, arboviral infections, relapsing fever, human T-lymphotropic virus Type I, and viral haemorrhagic fever (Ebola).
- 2.3 **Exposure Control Plan (S3AM-111-ATT1)** – A plan that addresses the requirements applicable to specific AECOM projects and activities designed to eliminate or minimize employee exposure. The Exposure Control Plan shall be incorporated into the location specific SH&E Plan and shall be accessible to all employees. The Exposure Control Plan shall include:
 - Exposure determination.
 - The schedule and method of implementation for:
 - o Methods of compliance;
 - o Hepatitis B Vaccination;
 - o Post exposure Evaluation;
 - o Communications of Hazards to employees; and
 - o Record Keeping.
 - Documentation methods for exposure incidents, to include:
 - o Routes of exposure; and
 - o The circumstances for which and exposure incident occurred.

Note: In the State of California this plan shall also address exposures to airborne pathogens.
- 2.4 **SH&E Plan** – A document prepared for a specific project or program that details the hazards, precautions, emergency planning, medical, and training requirements for that project or program.
- 2.5 **Occupational Exposure (Exposed)** – Reasonably anticipated skin, eye mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. Employees will be considered to be potentially exposed, even though they are using the universal precautions specified for the project or program.

- 2.6 **Other Potentially Infectious Materials (OPIM)** – Body fluids and tissues including: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, saliva, and any other body fluid that is visibly contaminated with blood. When it is difficult or impossible to differentiate between body fluids, all body fluids should be treated as if they are potentially infectious.
- Note: In the State of California airborne pathogens are also considered infectious materials.*
- 2.7 **Regulated Waste** – (1) liquid or semi-liquid blood or other potentially infectious materials; (2) contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; (3) items that are caked with dried blood or other potentially infectious materials and are capable of being released during handling; (4) objects contaminated with blood that can pierce the skin; and (5) pathological and microbiological wastes containing blood or other potentially infectious materials.
- 2.8 **Source Individual** – An individual, typically one who has been injured, whose blood or saliva has come in contact with another individual, typically one who has rendered first aid or Cardio Pulmonary Resuscitation (CPR) to the injured party.
- 2.9 **Universal Precautions** – All body fluids and materials potentially contaminated by body fluids will be considered to be infectious unless the fluids were from the person performing the clean up or decontamination activities. All employees coming in contact with another person's body fluids shall assume that the fluids are infectious and shall wear prescribed Personal Protective Equipment.

3.0 References

- 3.1 S3AM-003-PR1 SH&E Training
- 3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation
- 3.3 S3AM-017-PR1 Injury & Illness Recordkeeping
- 3.4 S3AM-128-PR1 Medical Screening & Surveillance
- 3.5 S3AM-208-PR1 Personal Protective Equipment
- 3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Occupational Health Manager

- Will review and maintain all medical records generated as a result of post-exposure follow-up and maintain all medical records related to the follow-up.
- Will, where appropriate, consult with AECOM's local medical providers about follow-up recommendations.

4.1.2 SH&E Manager

- Will review project / program-specific Exposure Control Plans (normally part of the SH&E Plan) prior to the initial mobilization, at least annually for continuing projects or programs, and whenever necessary to reflect modified tasks or procedures that affect occupational exposure to bloodborne pathogens.
- Will consult with the Occupational Health Manager regarding all bloodborne pathogens exposure incidents.
- Will maintain training records and post-exposure follow-up information.
- Will confirm that site-specific training is conducted for all employees working at sites where regulated wastes were disposed or for employees who may be occupationally exposed while working at a facility that handles regulated wastes.

- Will confirm the Hepatitis B vaccine is made available to all employees with a potential occupational exposure (e.g. paramedic, medical laboratory employee, etc.).
- Will review all incident reports and arrange for post-exposure follow-up with AECOM's local medical provider.
- Will offer recommendations on how to prevent an incident from recurring.

4.1.3 **Manager**

- See that all recommendations made by the SH&E Manager are implemented.
- Support the SH&E Manager in their efforts to prevent occupational and non-occupational exposures to bloodborne pathogens.

4.1.4 **Employee**

- Use all PPE and universal precautions required to prevent exposure to infectious materials.
- Follow the exposure control methods outlined in their Exposure Control Plan.
- Report potential exposure incidents to their Supervisor or Manager immediately.

4.2 Potential Exposure Situations

4.2.1 There are a few activities within AECOM where potential occupational exposures to blood or other potentially infectious materials are of concern. These activities may include:

- Investigations of properties that received regulated wastes.
- Site visits or audits at Treatment Storage and Disposal facilities where medical waste is handled.
- Site visits or audits at medical or health care facilities.
- The provision of first-aid or cardiopulmonary resuscitation (CPR) to AECOM, subcontractor, or client personnel (if the action is part of the employee's occupations duties [e.g. paramedic] and not provided as a voluntary action).

4.2.2 Although AECOM does offer first-aid and CPR training to its employees on a regular basis, providing such aid is often on a voluntary basis and not directed by AECOM. As such, potential exposures may not be considered occupational exposures within the context of the OSHA Bloodborne Pathogens Standard. Site-specific Exposure Control Plans shall differentiate voluntary first-aid duties from occupational exposures as a component of the exposure determination. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.3 Unforeseen Exposure Situations

4.3.1 Occasionally, potentially infectious material is encountered during a activity where none was expected; when this happens, the work shall be stopped, employee training conducted, and an exposure control plan prepared prior to resuming activities with potential exposures.

4.4 Employee Training

4.4.1 All personnel who will work on projects or programs which involve potential contact with regulated wastes will be required to attend a training class prior to the start of the project or program and annually for continuing projects or programs. Refer to *S3AM-003-PR1 SH&E Training*. The specific requirements and provisions of the written Exposure Control Plan shall be provided to each AECOM Employee and subcontractor assigned to work at the program / project.

4.4.2 Either of the following two sources of employee training will be used by AECOM to educate Employees on the hazards of exposure to bloodborne pathogens:

- The local chapter of the American Red Cross or other recognized training provider.
- AECOM's in-house training program.

4.4.3 Training sessions will review the following:

- Requirements of OSHA's Bloodborne Pathogens Standard or equivalent, applicable jurisdictional requirements.
- Review of AECOM's Bloodborne Pathogen Procedure (this document).
- Situations within AECOM that may involve exposure to bloodborne pathogens.
- Bloodborne diseases and symptoms of disease.
- Means of transmission.
- Work practice controls to reduce risk.
- Use of personal protective equipment to reduce risk.
- Incident reporting.
- AECOM's Post-Exposure Medical Follow-Up Procedures:

4.4.4 When contracting for CPR and first-aid training sessions, AECOM will request that each session include a section on the hazards associated with exposure to bloodborne pathogens and protective measures that shall be followed when administering first aid, CPR, or other emergency medical care. At the end of the session, Employees will be provided with a copy of this procedure. This procedure will be reviewed and a question-and-answer session will be conducted at the end of the presentation.

4.4.5 If the training provider cannot provide such training, AECOM will conduct a Blood Borne Pathogen training session prior to the start of the first aid or CPR class.

4.4.6 AECOM has and will have little control over employees who have not received AECOM provided first aid or CPR training, but who choose to perform Good Samaritan acts. Any Employee who does perform a Good Samaritan act that results in exposure to blood or other potentially infectious materials will, however, be provided with post-exposure medical follow-up as described in this procedure.

4.5 Personal Protective Equipment

4.5.1 All body fluids and materials potentially contaminated by body fluids will be considered to be infectious. All Employees coming in contact with another person's body fluids shall assume that the fluids are infectious and shall wear prescribed personal protective equipment (PPE), refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.5.2 The use of PPE to prevent exposure is more appropriate for the types of occupational and non-occupational exposures Employees might encounter than is the use of engineering or work practice controls that are more effectively instituted in medical care or laboratory facilities where employees are actually handling blood and other potentially infectious materials.

4.5.3 PPE such as Tyvek coveralls, shoe covers, and gloves will be provided to all field team members involved in site activities where regulated wastes may be present. Site-specific PPE requirements will be identified in the written Exposure Control Plan. The same type of PPE will also be available, if it is deemed necessary, for Employees involved with activities at TSD facilities that handle regulated wastes.

4.5.4 PPE will be provided to affected Employees at no cost.

4.6 Universal Precautions Kits

4.6.1 In those work areas where there is the potential for exposure to infectious materials, a universal precaution kit shall be readily available. The kit shall permit the clean-up, neutralization, transportation, and disposal of up to 1 litre of blood or body fluids. The kit shall contain the following items at a minimum:

- Safety shield/mask combination
- Liquid proof apron
- Medical-grade vinyl/nitrile gloves
- Liquid solidifier/deodorizer
- Pickup scoop with scraper
- Red biohazard waste bag with tie
- Germicidal solution with dry wipe
- Antimicrobial hand wipe
- ID tag
- Instructions for use

4.7 Personal Hygiene

- 4.7.1 Special provisions will be made so that hand washing facilities are available on-site for sites that are known to be contaminated with regulated wastes. Alcohol wipes will be available in the event that hand washing facilities are not immediately available.
- 4.7.2 To reduce the potential for infection, if skin contact with blood or other potentially infectious materials occurs, the exposed area should be washed with non-abrasive soap and water as soon as possible. Hand washing will also help to prevent the transfer of contamination from the hands to other areas of the body or other surfaces that may be contacted later. Even when protective gloves are worn, hands should be washed with non-abrasive soap and running water as soon as possible after the gloves are removed.
- 4.7.3 The use of an alcohol wipes should not be relied upon as the primary means of personal hygiene. Hands should be thoroughly washed with soap and running water as soon as possible.
- 4.7.4 If mucous membranes, such as the eyes, come in direct contact with blood or other potentially infectious materials, the area should be washed or flushed with water as soon as possible and reported immediately.

4.8 Reporting Exposure Incidents

- 4.8.1 All incidents in which an employee has been exposed to blood or other potentially infectious materials shall be reported to the employee's Supervisor and to the SH&E Manager immediately. An IndustrySafe on-line report shall be completed in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*. After reviewing the report, the SH&E Manager will provide recommendations, when appropriate, for preventing recurrence of the incident.

4.9 Medical Follow-Up to Exposure Incidents

- 4.9.1 Once notified, the SH&E Manager will in turn discuss the incident with AECOM's Occupational Health Manager and/or medical provider and make arrangements for an evaluation, refer to *S3AM-128-PR1 Medical Screening & Surveillance*. Prompt medical attention is important in the event of an exposure incident. If the incident occurs in the field, the Employee will either be asked to visit the local hospital or, if he/she chooses, return immediately to the office to visit AECOM's local medical provider.
- 4.9.2 An attempt will be made to test the affected employee, and if applicable, the source individual's blood, for bloodborne pathogens. No testing will be performed without the written consent of the exposed Employee or the source individual. If initially, the exposed Employee or the source individual does not consent to HIV serological testing, but does consent to HBV serological testing, AECOM will make provisions with the local medical provider to preserve the blood sample for at least 90 days in the event that after counselling efforts, the Employee voluntarily consents to HIV testing.

- 4.9.3 AECOM will rely on the professional judgment of its Occupational Health Manager and/or local medical providers in the event of an exposure incident. Evaluations and follow-up procedures will be provided according to the recommendations of the United States Public Health Service (USPHS), World Health Organization, or other Public Health organization in Canada and other countries in the Americas current at the time these evaluations and procedures take place. Minimally, a post-exposure evaluation and follow-up will include the following elements:
- Documentation of the route(s) of exposure
 - Circumstances under which the exposure incident occurred
 - Identification and documentation of the source individual in the case of first aid or emergency medical treatments
 - Collection and testing of source individuals and exposed employee's blood for HBV and HIV serological status as soon as feasible and upon consent
 - Post-exposure vaccination when medically indicated, as recommended by the USPHS
 - Counselling, if necessary
 - Evaluation of reported illnesses
- 4.9.4 Any and all follow-up recommendations offered by the physician will be immediately instituted by the SH&E Manager with the guidance of the Occupational Health Manager and/or the local medical provider and at no cost to the affected Employee. Repeat testing, counselling, and follow-up, if recommended, will also be provided at no cost to the Employee. AECOM will rely on the Occupational Health Manager and/or the local medical provider to provide counselling to Employees concerning infection status, including results of and interpretation of medical tests and advising the Employee about the protection of personal contacts.
- 4.9.5 All medical providers shall submit to AECOM's Occupational Health Manager and the affected Employee a written opinion of the post-exposure evaluation within 15 days of the completion of the evaluation.
- 4.9.6 All medical records generated as a result of the post-exposure evaluation will be retained in the office of the Occupational Health Manager, and as applicable AECOM's medical services provider, under lock and key and will be maintained with the strictest confidentiality. Refer to *S3AM-017-PR1 Injury & Illness Recordkeeping*.
- 4.10 Hepatitis Vaccination
- 4.10.1 Prior to performing site visits or field investigations where regulated wastes are stored, processed, or known to have been disposed of, AECOM will consult with the Occupational Health Manager and/or the local medical providers to determine if a hepatitis A or B vaccination is appropriate given the site conditions and the proposed scope of work. Where possible the first Hepatitis B vaccinations will be given prior to working at sites with known, potential occupational exposures.
- 4.10.2 Although AECOM does offer first-aid and CPR training to its Employees on a regular basis, providing such aid is often voluntary and not as a specified job duty of an Employee. As such, potential exposures may not be considered occupational within the context of the government Bloodborne Pathogens Standard. Pre-exposure hepatitis vaccinations will not typically be offered for voluntary roles.
- 4.10.3 Post-exposure hepatitis vaccination will be offered to Employees involved in an exposure incident within 24 hours of possible exposure.
- 4.10.4 The vaccinations discussed above shall be provided to Employees at no cost if required by the exposure determination.

4.11 Housekeeping

- 4.11.1 Other than through the provision of first aid or CPR, there is no potential for occupational exposure to blood or other potentially infectious materials within any of the AECOM offices. Therefore, the housekeeping requirements and requirements for warning signs and labels contained in the OSHA Bloodborne Pathogens standard are not applicable to our office operations.
- 4.11.2 When working at a site where regulated wastes have been disposed of, the specific housekeeping and warning sign requirements will be prescribed by the client and/or in the site-specific HASP.
- 4.11.3 When working at a client's facility, AECOM will review the facilities plan for compliance with all the requirements of the Bloodborne Pathogens Standard and will observe all housekeeping requirements, wear required PPE, and acknowledge all warning signs and labels as specified in the client's plan. If the client does not have an effective plan, AECOM will prepare a plan as part of the written Exposure Control Plan.

4.12 Regulated Waste Generated by AECOM

- 4.12.1 Any regulated waste generated by AECOM as a result of first aid activities or clean-up of potentially infectious material will be collected in sealed, watertight containers and disposed of according to the Host Employer's BBP program or disposed of through a permitted regulated waste facility.
- 4.12.2 Disposal manifests shall be maintained in accordance with local or governmental regulations.

4.13 Material Decontamination

- 4.13.1 Any areas or equipment that are contaminated by potentially infectious material will be decontaminated using a 10% solution of household bleach. Utilize appropriate personal protective equipment to control exposure to the bleach (e.g. safety goggles, gloves, etc.). Refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.14 Procedure and Plan Review

- 4.14.1 All Exposure Control Plans for projects or programs extending over one year shall be reviewed annually by the SH&E Manager and affected Employees.

5.0 Records

- 5.1 Each SH&E Manager will maintain records and provide copies of the records to the Occupational Health Manager, related to bloodborne pathogens in accordance with the provisions of the standard and *S3AM-017-PR1 Injury & Illness Recordkeeping*.
- 5.2 Records maintained in accordance will include bloodborne pathogens exposure incidents, post-exposure follow-up, vaccination status, and training for all Employees with potential occupational exposure.
- 5.3 Employee medical and training records required by this procedure shall be provided upon request for examination and copying to the Employee, to anyone having written consent of the subject employee, or to State, Province, or Federal Occupational Safety and Health regulatory agencies.

6.0 Attachments

- 6.1 [S3AM-111-ATT1 Bloodborne Pathogens Exposure Control Plan](#)
- 6.2 [S3AM-111-FM1 Hepatitis B Vaccination Declination](#)

Bloodborne Pathogens Exposure Control Plan

S3AM-111-ATT1

1.0 Introduction

Employees are at risk for exposure to and possible transmission of infectious diseases each time they are in contact with blood or body fluids. Bloodborne pathogens are microorganisms present in human blood and other body fluids that can cause serious disease in humans and include, but are not limited to Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and Human Immunodeficiency Virus (HIV). Therefore, this exposure control plan (ECP) has been established to ensure that employees are effectively informed concerning potential workplace health hazards, and that protective measures necessary to eliminate or minimize bloodborne exposure incidents are used whenever possible.

2.0 Exposure Determination

2.1 The Medical Screening Evaluation form will be used to evaluate which employees may incur occupational exposure to blood or other potentially infectious materials when performing routine tasks and procedures. Refer to *S3AM- 128-PR1 Medical Screening & Surveillance*. These exposure determinations will be made without regard to the use of personal protective equipment, and regardless of exposure frequency.

2.1.1 The employees in the following job classifications may have occupational exposure to bloodborne pathogens, and are covered by this program:

- Occupational health nurse
- Paramedics
- Registered nurses
- Designated first aid providers (providing first aid identified as part of the employee's occupational duties and not a voluntary action)
- Medical laboratory employees
- Janitorial workers in medical facilities and clinics.

2.1.2 Tasks and procedures that may expose the above employees to bloodborne pathogens include:

- Treating cuts, abrasions, and burns
- Cleaning contaminated environmental surfaces
- Administering cardiopulmonary resuscitation (CPR).

3.0 Exposure Control

3.1 "Universal precautions" are a required method of control to prevent exposure to blood and body fluids. This term refers to the concept that all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, HCV, and other bloodborne pathogens, regardless of the perceived risk status of another individual. Universal precautions apply to blood, other body fluids containing visible blood, semen, and vaginal fluids. Universal precautions do not apply to feces, nasal secretions, saliva, sweat, tears, sputum, urine, and vomitus unless they contain visible blood. Although these fluids have an extremely low or nonexistent risk for bloodborne pathogens, they are a potential source for other infectious diseases, and precautions shall also be followed when these body fluids are present.

3.2 Engineering and Work Practice Controls

3.2.1 The following engineering controls will be in place in all areas of occupational exposure:

- Containers for disposable contaminated sharps shall be puncture-resistant, labeled a biohazard, leak-proof, and have a closable top.

- Containers for storage, transport, or shipment of blood or other potentially infectious materials, regulated waste, and contaminated laundry will be labeled with the biohazard symbol and site address, and have a securely closing lid.
- Engineering controls will be reviewed and maintained on a regular basis to ensure effectiveness.

3.2.2 The following work practice controls (administrative and personal protective equipment) shall be strictly followed to minimize exposure, and isolate or remove bloodborne pathogens from the workplace:

- Accessible handwashing facilities. If soap and running water are not available, an antiseptic hand cleaner in conjunction with clean paper towels or antiseptic towelettes are acceptable temporary alternatives to running water. When this alternative method is used, employees shall wash their hands with soap and running water as soon as feasible.
- Personal protective equipment (PPE) will be provided at no cost to the employee, and will be chosen based on the anticipated exposure to blood. PPE is considered appropriate if it does not permit blood or other potentially infectious materials to reach or pass through clothes, skin, or mucous membranes of the eyes or mouth under normal conditions of use, and for the duration of time the equipment will be used. PPE shall be readily accessible and will be removed prior to leaving the work area.
- Disposable single-use gloves shall be used as a protective barrier in all situations in which contact with body fluids is anticipated. Gloves of the correct size will be provided. Disposable gloves will not be washed or disinfected for reuse, and will be replaced between employees, and if they become torn or punctured. Gloves are especially important if the employee has cuts, abraded skin, chapped hands, or dermatitis.
- Liquid-impermeable gowns, boots, and masks, in combination with eye-protective devices such as goggles and shatterproof glasses with solid-side shields or chin-length face shields, shall be worn whenever splashing, spraying, or spattering of blood droplets or body fluids can be reasonably anticipated.
- Disposable pocket mask ventilation devices shall be provided in all first aid kits and used to avoid mouth-to-mouth contact during emergency cardiopulmonary resuscitation.
- Examples of Recommended PPE (depending on task, more PPE may be needed).

<u>Task</u>	<u>Gloves</u>	<u>Gown</u>	<u>Mask</u>	<u>Goggles</u>
Bleeding control w/ minimal bleeding	Yes	No	No	No
Bleeding control w /spurting blood	Yes	Yes	Yes	Yes
Cardiopulmonary resuscitation	No	No	Yes	No
Decontamination/clean-up	Yes	No	No	No
Medical laboratory activities	Yes	Yes	Yes	Yes

3.2.3 Eating, drinking, smoking, applying cosmetics, and handling of contact lenses is prohibited in work areas where there is a reasonable likelihood of occupational exposure. Food and drink cannot be kept in refrigerators, freezers, shelves, cabinets, or on counter tops where blood or body fluids are present.

3.2.4 Contaminated needles and other sharps shall not be bent or recapped unless a one-handed technique is used. They shall be disposed of in an appropriate sharps container.

3.2.5 All regulated biohazardous waste will be placed in a waste receptacle that has designated red biohazard bags and a closable top controlled by a foot peddle. When full, the bags shall be removed with gloved hands, tied off, and placed in a biohazard shipping carton, to be held for pick-

up. If any biohazard bag appears to be leaking, it shall be double-bagged. The waste will be incinerated per federal, provincial/territorial/state regulations.

3.3 Housekeeping

- 3.3.1 Universal precautions shall be used when cleaning or decontaminating any surface or equipment that may be contaminated. Appropriate PPE shall be used for protection during decontamination.
- 3.3.2 All contaminated environmental work surfaces such as countertops or floors will be cleaned according to regulatory requirements or with a household bleach solution diluted 1:10 with water directly following contamination with blood or body fluids.
- 3.3.3 Instruments such as tweezers, bandage scissors, and thermometers shall be disposable rather than reusable equipment, and shall be disposed of in an appropriate manner.
- 3.3.4 Broken, contaminated glassware shall not be picked up directly with the hands. It shall be cleaned up using a mechanical means such as a brush and dustpan or tongs.

4.0 Hepatitis B Vaccination

- 4.1 Within 10 working days of placement, all employees assigned to tasks with potential occupational exposure to bloodborne pathogens shall be offered the Hepatitis B vaccination at no cost to the employee, unless the employee has had a previous Hepatitis B vaccination series, antibody testing reveals the employee is immune, or the vaccine is contraindicated for medical reasons. Further, this vaccination series shall be made immediately available to employees who have an occupational exposure, whether as a result of their assigned tasks, or occurring from an incidental contact.
- 4.2 The local occupational medical facility used for routine medical surveillance will administer the vaccinations.
- 4.3 Employees who decline the Hepatitis B vaccine shall sign a copy of the waiver form located at the end of this Work Instruction. The signed waiver will be stored in the employee's medical record with the Occupational Health Manager. Employees may initially decline the vaccination, but may decide to take them at a later date, while still covered under this plan. The vaccinations will be made available to the employee at that time.
- 4.4 Employees choosing to take the vaccination series will sign a consent form at the occupational clinic prior to receiving the injections, and are advised to read the package insert regarding the efficacy, safety, method of administration, and benefits of the vaccine. Employees may also ask questions directly of the Medical Service Provider or local occupational physician. Employees are not required to participate in a prescreening program (to determine immunity) before receiving the vaccinations. If a routine booster of Hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) will be made available to affected employees.

5.0 Post-Exposure Incident Evaluation And Follow-Up

- 5.1 All occupational bloodborne pathogen exposures shall be reported to the HSE representative and Occupational Health Manager immediately after initial decontamination first aid is accomplished. Following the report of an exposure incident, a confidential medical evaluation with an occupational physician will be arranged as soon as possible, ideally no later than 1 to 2 hours after the incident has occurred. In some jurisdictions, depending on applicable workers' compensation law, employees may choose treatment from their personal physician. A copy of the OSHA Bloodborne Pathogen Standard, if applicable to the jurisdiction, will be provided if the physician does not have a copy. A written incident report shall be completed as soon as possible, fully describing the incident.
- 5.2 First aid protocol for treatment immediately after an exposure incident:
 - 5.2.1 Lacerations, punctures, and abrasions should be washed under cool running water for at least 5 minutes, allowing free bleeding. Cleanse area well with soap or iodine solution. Apply sterile dressing as needed. Give tetanus booster if indicated (7 to 10 years since last booster).

- 5.2.2 Ocular exposure requires irrigation of the eye with water or sterile normal saline solution for 15 minutes.
- 5.2.3 Mucous membrane exposure requires rinsing mouth with ½ strength 3 percent hydrogen peroxide for 30 seconds, four separate and consecutive times.
- 5.3 Confidential Medical Evaluation
 - 5.3.1 The treating occupational physician will receive documentation of the routes of exposure, the circumstances surrounding the incident, and identification of the source individual (the individual the employee was exposed to). The blood of the source individual will be tested if possible, and after consent is obtained. When legally permissible, results of the source individual's tests will be made available to the exposed employee, with the exposed employee informed about the applicable laws and regulations concerning the disclosure of the identity and infectivity of the source individual.
 - 5.3.2 Testing of the exposed employee's blood, if consented to (the employee may consent to baseline blood collection, but may request that the sample not be tested for HIV for up to 90 days, if at all), is recommended.
 - 5.3.3 Post-exposure medical treatment will be offered in accordance with the current recommendations of the U.S. Public Health Services. This may include, but is not limited to:
 - A series of HIV post-exposure blood tests
 - Hepatitis B vaccination and/or Hepatitis B immune globulin
 - HIV post-exposure prophylactic medications
 - Evaluation of acute febrile illnesses following exposure
 - Employee counseling concerning precautions to take during the period after the exposure incident, and information on signs and symptoms of potential illnesses.
- 5.4 Healthcare Professional's Written Opinion
 - 5.4.1 The Occupational Health Manager shall obtain and provide the employee with a copy of the evaluating physician's written opinion within 15 days of the completion of the medical evaluation. A copy will be maintained in the employee's confidential medical record. The written opinion shall be in accordance with the requirements of the OSHA Bloodborne Pathogens Standard indicating that the employee has been informed of any medical conditions resulting from exposure that require further evaluation or treatment. All other findings or diagnoses shall remain confidential and will not be included in the report.

6.0 Hazard Communication

- 6.1 Fluorescent red or orange-red warning labels bearing the universal biohazard symbol and the legend BIOHAZARD shall be firmly affixed to all containers (e.g., waste cans, sharps containers, and refrigerators) used for the storage or shipment of blood or other potentially infectious materials.
- 6.2 All employees designated to perform tasks involving occupational exposure shall receive bloodborne pathogens training at the time of initial assignment to the job. This training will be given during working hours and at no cost to employees. Refresher courses will be provided annually (within 1 year of previous training), and if new tasks or procedures are implemented. Material appropriate in content and vocabulary to education level, literacy, and language of the employees shall be used for all required training.
- 6.3 Training will include: making accessible a copy of the regulatory text of the standard and explanation of its contents, general discussion on bloodborne diseases and their transmission, exposure control plan, engineering and work practice controls, personal protective equipment, Hepatitis B vaccine, response to emergencies involving blood, how to handle exposure incidents, the post-exposure evaluation and follow-up program, signs/labels/color-coding, and question and answer time with the trainer.

7.0 Exposure Incident Investigation

- 7.1 The SH&E Manager will review the circumstances of any exposure incident to determine corrective actions. The incident report will include:
- 7.1.1 Engineering controls in use at the time
 - 7.1.2 Work practices followed
 - 7.1.3 A description of any equipment being used
 - 7.1.4 A description of the work being performed
 - 7.1.5 PPE that was used at the time of the incident
 - 7.1.6 Date, time, and location of the incident
 - 7.1.7 Employee's training.
- 7.2 An incident report shall be completed within four hours of the incident and entered into AECOM's on-line incident reporting system (e.g., IndustrySafe) in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigations*. A copy of this incident report will be forwarded to the Occupational Health Manager, who will evaluate what follow-up actions should be addressed, including if revisions need to be made to the Exposure Control Plan.

8.0 Recordkeeping

- 8.1 The Occupational Health Manager will be responsible for establishing and maintaining accurate, confidential workers' compensation medical records for each employee with occupational exposure for the duration of employment plus 30 years, in accordance with OSHA 29 CFR 1910.1020 – Access to Employee Exposure and Medical Records.
- 8.2 The SH&E Manager will be responsible for maintaining the bloodborne pathogens training class records for at least 3 years from the date of training. The records will include the date of the training class, a summary of the class contents, the names of the qualified instructors, and the names and job titles of personnel attending the training.
- 8.3 Employee medical records shall be made available to employees (or their designated representative) with written consent by the employee within 15 working days of request.
- 8.4 An exposure incident will be evaluated by the Occupational Health Manager and SH&E Manager to determine if the case meets OSHA's Recordkeeping Requirements (29 CFR 1904).

Americas

Hepatitis B Vaccination Declination

S3AM-111-FM1

I understand that due to my occupational exposure to blood or other potentially infectious materials, I may be at risk of acquiring Hepatitis B virus (HBV) infection.

I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself; however, I decline Hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease.

If, in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with the Hepatitis B vaccine, I can receive the vaccine series at no cost to me.

Name:

Date:

Witness:

Date:

Cold Stress

S3AM-112-PR1

1.0 Purpose and Scope

- 1.1 To protect employees from the severest effects of cold stress (hypothermia) and cold injury and to identify exposures to cold working conditions under which it is believed nearly all employees can be repeatedly exposed without adverse health effects.
- 1.2 This procedure applies to all AECOM Americas based employees and operations, and any other entity and its personnel contractually required to comply with this document's content, working outdoors in damp and cool (below 50 degrees Fahrenheit [°F] or 10 degrees Celsius [°C]) conditions or anytime temperatures are below 32°F or 0°C.

2.0 Terms and Definitions

- 2.1 **Cold Stress** – The production of physiological effects due to cold temperatures and/or wind chill.
- 2.2 **Equivalent Chill Temperature (ECT)** – Also known as Wind Chill (see below).
- 2.3 **Frostnip** – Superficial cooling of tissues without cellular destruction.
- 2.4 **Frostbite** – Freezing of tissue, resulting in tissue destruction.
- 2.5 **Hypothermia** – Condition of reduced core body temperature to 95°F (35°C) resulting in loss of dexterity, loss of mental alertness, collapse, and possible death.
- 2.6 **Wind Chill** – The combined effect of air temperature and wind. Also expressed as "equivalent chill temperature" (ECT), wind chill is defined as heat loss resulting from the effects of air temperature and wind velocity upon exposed skin.

3.0 References

- 3.1 S3AM-003-PR1 SH&E Training
- 3.2 S3AM-128-PR1 Medical Screening & Surveillance Program
- 3.3 S3AM-208-PR1 Personal Protective Equipment
- 3.4 S3AM-314-PR1 Working Alone
- 3.5 S3AM-315-PR1 Working On or Near Water
- 3.6 S3AM-333-PR1 Marine Safety & Vessel Operations

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Manager

- Ensuring the safety of employees on their project sites, consistent with regulatory standards.
- Implement cold stress prevention measures as applicable at each work site.
- Develop/coordinate a work-warning regimen, as applicable.
- Confirm cold stress hazard assessments/evaluations were completed for the planned activities.
- Assign employees physically capable of performing the assigned tasks. Consider acclimation to cold weather when evaluating employee capability.

- Confirm employees are properly trained to recognize the symptoms of cold stress.

4.1.2 **Safety, Health and Environment (SH&E) Manager**

- Conduct/support cold stress assessments/evaluations.
- Conduct/support incident investigations related to potential cold stress-related illnesses.
- Assist project teams develop appropriate work-warming regimens.
- Provide cold stress awareness training.

4.1.3 **Supervisor**

- Identify the tasks that may be most impacted by cold stress and communicate the hazard to the assigned employees.
- Confirm that employees have been trained on the recognition of cold stress-related illnesses.
- Confirm that adequate supplies of warm fluids/drinks are readily available to employees.
- Confirm that a warm/sheltered rest area is available, as applicable.
- Conduct cold stress monitoring, as applicable.
- Implement the work-warming regimen.
- Confirm that first aid measures are implemented once cold stress symptoms are identified.
- Confirm that employees are physically capable of performing the assigned tasks and are not in a physically compromised condition.

4.1.4 **Employee**

- Observe each other for the early symptoms of cold stress-related illnesses.
- Maintain an adequate intake of available fluids.
- Report to work in a properly rested condition.
- Report all suspected cold stress-related illnesses.

4.2 **Requirements**

- 4.2.1 Carefully plan work anticipated to be performed in cool or cold conditions. If possible, heavy work should be scheduled during the warmer parts of the day or when the wind is most calm. Include costs in project budgets for specialized equipment and supplies needed to complete the field activities.
- 4.2.2 Staff working in extreme cold (wind chill or ECT below 10°F or -12°C) shall not work alone. The Buddy System shall be utilized to keep an eye on each other and to watch for signs of cold stress. Refer to *S3AM-314-PR1 Working Alone*. Watch for symptoms and signs of hypothermia.
- 4.2.3 Monitor weather forecasts and weather conditions such as ambient temperature, wind speed, and precipitation. Use observations prior to entering and while in the field to ensure appropriate protections are in place:
- If possible, move the work to a warm location.
 - If possible and as applicable, erect shelters or screens around the work area.
 - If possible, heat the work area.
 - If possible, adjust schedule according to the cold conditions, work level and worker acclimatization.
 - Implement a work-warming regimen by taking breaks out of the cold. As applicable, consult *S3AM-112 ATT1 Temperature Thresholds* to determine wind chill and work-warming schedule.
 - Take frequent short breaks in warm dry shelters to allow your body to warm up. Limit time of exposure to the cold. If shelter is not readily available, consider supplying temporary shelters.

- Provide assistance to prevent body heat loss, such as:
 - o Providing appropriate sources of heat (e.g. warm packs, portable heaters, etc.).
 - o Use of insulating materials on equipment handles when temperatures drop below 30°F (-1°C).

4.2.4 All staff working in extreme cold or snow conditions should understand the following guidelines for preventing and detecting hypothermia and frostbite; refer to *S3AM-112-ATT2 Symptoms & Treatment*:

- Ensure appropriate PPE requirements are established and adhered to.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Because prolonged exposure to cold air or to immersion in cold water at temperatures even well above freezing can lead to dangerous hypothermia, whole-body protection shall be used.
- Eat high calorie snacks to help maintain body metabolism.
- Confirm extra blankets or sleeping bags are on-site.
- Drink plenty of warm liquids. It is easy to become dehydrated in cold weather.
- Avoid caffeine and alcohol, which can act as diuretics. Alcohol consumption, depending upon quantity, can dilate blood vessels enhancing body heat loss or constrict blood vessels decreasing heat delivery to extremities.
- NEVER IGNORE SHIVERING. Persistent or violent shivering is a clear warning that you are on the verge of hypothermia.
- If you experience frost bite or hypothermia, find shelter and warmth and contact a medical practitioner if symptoms persist, refer to *S3AM-128-PR1 Medical Screening & Surveillance*.

4.3 Training

Before they begin work in a cold environment, employees that might be exposed to cold stress will be informed of the potential for cold stress and how to prevent cold stress. Employees that have not had the training within the twelve prior months shall repeat the training before exposure to cold stress, refer to *S3AM-003-PR1 SH&E Training*. Employees potentially exposed to cold stress will receive training including, but not limited to:

- 4.3.1 Sources of cold stress, the influence of protective clothing, and the importance of acclimatization.
- 4.3.2 How the body loses heat.
- 4.3.3 Recognition of cold-related illness symptoms.
- 4.3.4 Cold stress preventative/corrective measures including, but not limited to:
 - Weather monitoring.
 - Proper eating and drinking practices.
 - Work-warming schedules and proper re-warming techniques.
 - Buddy system.
 - Safe cold work practices appropriate to the work that is to be performed.
 - Proper use of cold environment personal protective clothing.
- 4.3.5 The harmful effects of excessive alcohol consumption in a cold stress environment.
- 4.3.6 The hazards associated with unstable snow or ice build ups.
- 4.3.7 First aid procedures for symptoms related to cold stress.

4.4 Personal Protective Equipment (PPE)

Wearing the right clothing is crucial to avoiding cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, retains its insulation even when wet. Adequate insulating dry clothing will be required in air or wind chill temperatures below 40 °F (4.4°C)

All PPE will comply with the requirements of *S3AM-208-PR1 Personal Protective Equipment* and consider the following requirements:

- 4.4.1 Wear at least 3 layers of clothing to help prevent cold stress. It is important to preserve the air space between the body and the outer layer of clothing to retain body heat.
 - Wear a middle layer of down, wool, or similar materials to provide insulation.
 - Avoid cotton, especially blue jeans.
 - Wear an outer layer to break the wind and allow some ventilation (e.g., Gortex® or nylon)
 - Do not wear tight clothing. Loose clothing allows better ventilation.
- 4.4.2 Wear proper clothing, including head coverings and gloves or mittens for cold, wet, and windy conditions.
- 4.4.3 Wear a hat or hardhat liner. Up to 40 percent of body heat can be lost when the head is left exposed.
- 4.4.4 Use insulated footwear with adequate traction to prevent slips and falls.
- 4.4.5 Wear insulated boots or other insulated footwear, and insulated gloves to help reduce the chance of frostbite.
- 4.4.6 Keep a change of dry clothing available in case work clothes become wet.
- 4.4.7 Eye and face protection for employees employed outdoors in a snow and/or ice-covered terrain should be supplied.
 - Sunglasses (with UVA and UVB protection) and sunscreen should be used when there is a persistent combination of snow and direct sun.
 - Special safety goggles to protect against blowing ice crystals and ultraviolet light and glare (which can produce temporary conjunctivitis and/or temporary loss of vision) should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.
 - Ensure face guards are used to protect skin in cold, windy conditions, including riding on an unshielded vehicle.

4.5 General Cold Stress Prevention Measures

- 4.5.1 In order to prevent hypothermia:
 - Wear appropriate clothing and PPE as determined by the weather conditions.
 - When active, ventilate excess heat by opening or removing outer layers of clothing to avoid sweating.
 - o Start with the mitten or gloves, unless protection from ice, snow, or cold metal surfaces is needed.
 - o Next remove head gear and neck wrappings.
 - o Then coats/parkas should be opened at the waist and sleeves.
 - o Finally, layers of clothing should be taken off.
 - o When resting or tired, or colder conditions are encountered, add additional layers of clothing/ close outer layers in the reverse of the above order, or get out of the cold. Have a sweet drink but do not indulge in heavy eating.

- Garments worn to keep out rain and spray should also allow water vapor to escape.
- Take advantage of heat from the sun and stay out of the wind as much as possible.
- Have available emergency shelter providing protection from wind and rain and insulation from the ground.
- Replace wet clothing. If wet clothing cannot be replaced, then cover it with a layer of non-breathing material to prevent evaporation. Place an insulation layer over this non-breathing material.
- Get adequate rest; conserve energy.
- Get adequate nutrition to replenish energy stores; rest after meals.
- Drink adequate fluids to avoid dehydration.
- If any project / location staff member shows signs of hypothermia, stop and treat him/her.

4.5.2 In order to prevent frost bite:

- Dress to prevent hypothermia and protect the feet and hands.
- Avoid obstruction of circulation by, for example, tight boots or tightly fitting clothing.
- Avoid nicotine (particularly cigarettes) and do not consume alcohol.
- Keep ears and nose covered and out of the wind.
- Frostbite of the corneas of the eyes can be prevented by protective goggles.
- Adopt a "buddy system" of constantly watching the faces of others in the party for white skin tissue, which is evidence of frostbite (frostnip).
- Practice constant personal vigilance for signs of trouble in one's own fingers and toes; when in doubt, investigate thoroughly before it is too late.

4.5.3 Adequate, insulating dry clothing that will help maintain core temperatures above 96.8°F (37°C) shall be provided to employees if work is performed in air temperatures below 40°F (4.4°C). Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required.

4.5.4 An Equivalent Chill Temperature (ECT) chart relating the actual dry bulb air temperature and the wind velocity is presented in *S3AM-112-ATT1 Temperature Thresholds*. Unless unusual or extenuating circumstances exist, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Superficial or deep local tissue freezing will occur only at temperatures below 32°F (0°C) regardless of wind speed. However, older employees, those with circulatory problems and those with previous cold injuries require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions that should be considered.

4.5.5 Continuous exposure of skin should not be permitted when the air speed and temperature results in an ECT of -25°F (-32°C) or below.

4.5.6 At air temperatures of 40°F (4.4°C) or less, it is imperative that employees who become immersed in water or whose clothing becomes wet be immediately removed from the cold environment, provided a change of clothing, and be treated for hypothermia.

4.5.7 If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.

4.5.8 Adequate protection, such as general ventilation, shall be incorporated into any warming shelter design to prevent carbon monoxide poisoning.

- 4.5.9 Operation of internal combustion or similar devices within warming shelters is prohibited.
- 4.5.10 If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.
- 4.5.11 Walking and working surfaces shall be cleared of ice and snow to prevent slips and falls.
- 4.5.12 Confirm that employees carry fire starter materials if working in remote areas.
- 4.5.13 Supplies such as PPE, fuels, enclosures, de-icing, traction aids, warm drinks, and batteries will be specified by the SH&E Manager and/or the Manager and made available. These supplies will be inspected at least weekly during cold weather projects and replaced when necessary.
- 4.6 Cold Stress Prevention Measures for the Hands
 - 4.6.1 Special protection of the hands is required to maintain manual dexterity for the prevention of accidents including, but not limited to the following:
 - If fine work is to be performed with bare hands for more than 10 to 20 minutes in an environment below 60°F (15°C), special provisions should be established for keeping the employees' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30°F (-1° C).
 - If the air temperature falls below 60°F (15°C) for sedentary work, 40°F (4.4° C) for light work, or 20°F (-6°C) for moderate work, and fine manual dexterity is not required, employees should use gloves.
 - 4.6.2 To prevent contact frostbite, employees should wear anti-contact gloves:
 - When cold surfaces below 20°F (-6°C) are within reach, each employee should be warned to prevent inadvertent contact by bare skin.
 - If the air temperature is 0°F (-18°C) or less, employees should protect their hands with mittens or appropriate gloves. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens or gloves.
 - Ensure an adequate supply of dry gloves is available to replace wet gloves.
 - 4.6.3 Provisions for additional total body protection are required if work is performed in an environment at or below 40°F (4.4°C). The employees should wear cold protective clothing appropriate for the level of cold and physical activity.
 - 4.6.4 Additional Cold Stress Prevention Measures:

For work practices at or below 10°F (-12°C) ECT, the following will apply:

 - The employee should be under constant protective observation (buddy system or supervision).
 - The work rate should not be so high as to cause heavy sweating that will result in wet clothing. If heavy work is being performed, rest periods should be taken in heated shelters and opportunities to change into dry clothing should be provided.
 - New employees should not be required to work full time in the cold during the first days of employment until they become acclimated to the working conditions and required protective clothing. Refer to *S3AM-112-ATT1 Temperature Thresholds* for guidance.
 - The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the employee.
 - The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The employee should be protected from drafts to the greatest extent possible.

- 4.6.5 Employees handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of “cryogenic fluids” or those liquids with a boiling point that is just above ambient temperature.
- 4.6.6 Trauma sustained in freezing or subzero conditions requires special attention, because an injured employee is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.

4.7 Hypothermia in Water

- 4.7.1 Loss of body heat to the water is a major cause of deaths in boating and working near water incidents. Often the cause of death is listed as drowning; however, the primary cause is often hypothermia. It should also be noted that alcohol lowers the body temperature around 2 to 3 degrees by dilating the blood vessels. Do not drink alcohol around cold water. The following table shows the effects of hypothermia in water:

WATER TEMPERATURE	EXHAUSTION	SURVIVAL TIME
32.5°F (0°C)	Under 15 minutes	Under 15 to 45 minutes
32.5 to 40°F (0 to 4°C)	15 to 30 minutes	30 to 90 minutes
40 to 50°F (4 to 10°C)	30 to 60 minutes	1 to 3 hours
50 to 60°F (10 to 16°C)	1 to 2 hours	1 to 6 hours
60 to 70°F (16 to 21°C)	2 to 7 hours	2 to 40 hours
70 to 80°F (21 to 27°C)	3 to 12 hours	3 hours to indefinite
Over 80°F (27°C)	Indefinite	Indefinite

- 4.7.2 Some points to remember when water is a potential hazard:

- Wear a personal flotation device when drowning is a potential hazard. Refer to *S3AM-315-PR1 Working On or Near Water*, and *S3AM-333-PR1 Marine Safety & Vessel Operations*.
- If the water is less than 50°F (10°C), wear a wet suit or dry suit for work in water (e.g., wading, or if a significant potential to fall in water exists).
- While in the water, do not attempt to swim unless to reach nearby safety. Unnecessary swimming increases the rate of body heat loss. Keep the head out of the water. This will increase survival time.
- Keep a positive attitude about rescue. This will increase chances of survival.
- If there is more than one person in the water, huddling is recommended to conserve body heat.

- 4.7.3 If an employee or equipment is to work on ice and the water beneath the ice is or may be more than 3¼ feet (1m) deep at any point:

- Test the ice prior to commencing to ensure it will support the load to be placed on it. Ongoing testing may be necessary.
- If there is any risk of falling through the ice employees must wear personal protective equipment that will ensure buoyancy and protect against hypothermia at all times while on the ice.

4.8 Work-Warming Regimen

- 4.8.1 If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below 19°F (−7°C), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The employees should be encouraged to use these shelters at regular intervals; the frequency will depend on the severity of the environmental exposure. Refer to *S3AM-112-ATT1 Temperature Thresholds* for guidance.

- 4.8.2 The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter.
- 4.8.3 When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing should be loosened to permit sweat evaporation or a change of dry work clothing provided.
- 4.8.4 A change of dry work clothing should be provided as necessary to prevent employees from returning to the cold environment with wet clothing.

5.0 Records

- 5.1 Exposure assessments will be documented in the location's files.

6.0 Attachments

- 6.1 [S3AM-112-ATT1 Temperature Thresholds](#)
- 6.2 [S3AM-112-ATT2 Symptoms & Treatment](#)

Americas

Temperature Thresholds

S3AM-112-ATT1

1.0 Purpose and Scope

- 1.1 The following Tables 1 and 2 give apparent temperatures (wind chill or equivalent chill temperature [ECT]) for various combinations of wind and air temperature, as well as guidelines to the danger of skin exposure.

Table 1. Wind Chill Chart (C)

Actual Temp (°C)	Wind Speed in km/hour									
	8	16	24	32	40	48	56	64	72	80
	Ambient Temperature (°C)									
0	-2	-8	-11	-14	-16	-17	-18	-19	-19	-20
-5	-7	-14	-18	-21	-23	-25	-26	-27	-28	-28
-10	-12	-20	-25	-28	-31	-33	-34	-35	-36	-36
-15	-18	-26	-32	-35	-38	-40	-42	-43	-43	-44
-20	-23	-32	-38	-43	-46	-48	-50	-51	-52	-52
-25	-28	-38	-45	-50	-53	-56	-57	-59	-59	-60
-30	-33	-45	-52	-57	-61	-63	-65	-67	-67	-68
-35	-39	-51	-59	-64	-68	-71	-73	-75	-75	-76
-40	-44	-57	-65	-71	-75	-79	-81	-83	-83	-84
-45	-49	-63	-72	-78	-83	-86	-89	-90	-91	-92
-50	-54	-69	-79	-85	-90	-94	-96	-98	-99	-100

Note: A. Little Danger: if less than one hour of exposure to dry skin.

B. Danger: Exposed flesh freezes within one minute.

C. Great Danger: Flesh may freeze within 30 seconds.

Source: *2014 Threshold Limit Values (TLV™) and Biological Exposure Indices (BEI™) booklet; published by ACGIH, Cincinnati, Ohio.

Table 2. Equivalent Chill Temperature Chart (F)

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)									
	50	40	30	20	10	0	-10	-20	-30	-40
	Equivalent Chill Temperature (°F)									
Calm	50	40	30	20	10	0	-10	-20	-30	-20
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-24	-33	-46	-58	-70
15	36	22	9	-5	18	-32	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-75	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	35	-51	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Wind speeds >40 mph have little additional effect	LITTLE DANGER				INCREASING DANGER			GREAT DANGER		
	Trenchfoot and immersion foot may occur at any point on this chart.									

- 1.2 How fast a person's body cools in cold weather depends on: air temperature, wind speed, heat of the sun, and work being done.
- 1.2.1 The following Table 3 provides guidelines for establishing periods of work to warming break periods based on ambient temperature and wind speed for workers wearing dry clothing.
- 1.2.2 Notes following the Table take into account additional factor such as physical exertion, whether workers are acclimatized, etc.

Table 3. Work-Warming Schedule Guidelines

Air Temp. (Sunny Sky) °F	No Noticeable Wind		5 mph Wind (8 km/h)		10 mph Wind (16 km/h)		15 mph Wind (24 km/h)		20 mph Wind (32 km/h)		25 mph Wind (40 km/h)		Air Temp. (Sunny Sky) °C
	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	
above 5°	Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		above -15°
5° to -1°											100 min	2	-15° to -17°
0° to -4°									100 min	2	75 min	2	-18° to -20°
-5° to -9°							100 min	2	75 min	2	55 min	3	-21° to -22°
-10° to -14°					100 min	2	75 min	2	55 min	3	40 min	4	-23° to -25°
-15° to -19°					100 min	2	75 min	2	55 min	3	40 min	4	30 min
-20° to -24°	100 min	2	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work	-29° to -31°	
-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work	-32° to -34°			
-30° to -34°	55 min	3	40 min	4	30 min	5	Cease Work	-35° to -37°					
-35° to -39°	40 min	4	30 min	5	Cease Work	-38° to -39°							
-40° to -44°	30 min	5	Cease Work	-40° to -42°									
-44° & below	Cease Work			-43° & below									

Modified from ACGIH 2014 Threshold Limit Values for Chemical Substances and Physical Agents.

- Note 1: Schedule describes the maximum continuous duration of work and number of 10-15 minute breaks to be observed during any 4-hour work period and assumes that period will be followed by an extended warm-up period (e.g., lunch). Allowed breaks should be taken in a warm environment.
- Note 2: Schedule applies to moderate to heavy work performed by acclimated workers wearing appropriate layered clothing. For light to moderate work apply the schedule for conditions one step lower. For unacclimated workers apply the schedule for conditions two steps lower. These modifications are additive.
- Note 3: For work under 25%–50% overcast/clouds, apply the schedule for conditions one step lower. For work at night or under greater than 50% overcast/clouds, apply the schedule for conditions two steps lower. These modifications are additive with any applicable modifications from Note 2.

Note 4: For wind speeds in excess of 25 mph (40 km/h), cease all nonemergency work when temperatures fall below 5°F (-21°C).

Note 5: When the work involves riding on an unshielded vehicle or some other activity that generates wind, the number of breaks should be increases appropriately.

Note 6: If effective protection against the wind can be provided by shields or screens, work modifications or measures, then the work warm-up schedule for “No Noticeable Wind” would apply.

Note 7: If reliable weather reports are not available, use the following as a guide to estimate wind velocity:

- A 5 mph (8 km/h) wind will move a light flag
- A 10 mph (16 km/h) wind will fully extend the flag
- A 15 mph (24 km/h) wind will raise a newspaper sheet
- A 20 mph (32 km/h) wind will produce blowing and drifting snow.

Symptoms & Treatment

S3AM-112-ATT2

1.0 Cold Stress-related Illnesses

1.1 Frostbite

- 1.1.1 Frostbite is a localized cold injury characterized by freezing of the tissues with ice crystal formation. There are several degrees of damage. Frostbite can be categorized into:
- **Frost Nip or Initial Frostbite:** (1st degree frostbite) Characterized by blanching or whitening of skin.
 - **Superficial Frostbite:** (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.
 - **Deep Frostbite:** (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.
- 1.1.2 Frostbite injury is almost always limited to the upper and lower extremities (finger and toes) or to such appendages as the ears, nose or cheeks.
- 1.1.3 Conditions conducive to frostbite include sub-zero temperatures, hypothermia, dehydration, obstruction of the blood supply to the extremities (by constricting clothing, especially on the feet or at the wrists or ankles), contact with cold metal, contact with organic liquids (such as gasoline or solvents that have been left outdoors in sub-zero temperatures), use of substances that cause vasoconstriction (such as smoking tobacco), or other injury or shock.
- 1.1.4 Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues.
- 1.1.5 Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.
- 1.1.6 The first symptom of frostbite is an uncomfortable sensation of coldness and pain, followed by numbness. There may be tingling, stinging, or cramping. Ongoing symptoms of frostbite include:
- Sudden and complete cessation of cold or discomfort in affected fingers or toes, often followed by a pleasant feeling of warmth;
 - Subsequently the only symptom may be the absence of any sensation in the frozen part;
 - Paleness in the affected tissues;
 - Firm or hard tissues; and
 - Purple tissue, if a large area, such as an entire hand or foot, is frostbitten.
- 1.1.7 If exposure occurs in temperatures that are below freezing (32°F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Symptoms due to frostbite may include, but is not limited to:
- Superficial redness of the skin;
 - Slight numbness;
 - Blisters;
 - Obstruction of blood flow (ischemia);
 - Blood clots (thrombosis); and
 - Skin discoloration due to insufficient oxygen in the blood (cyanosis).

- 1.1.8 Frostbite may occur if the skin comes into contact with objects with a surface temperature below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death, and ulceration.
- 1.1.9 Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

1.2 Hypothermia

- 1.2.1 Hypothermia is a lower than normal body temperature that occurs when outer cold cools the body faster than the body can produce heat to stay warm. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are the first affected.
- If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia.
 - Further heat loss produces speech difficulty, confusion, loss of manual dexterity, collapse, and finally death.
- 1.2.2 Hypothermia can be caused by exposure to wind, cold, and/or moisture. The combination of wind, cold, and moisture can be deadly. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia is described in the table below.

Condition	Core Body Temp.	Signs/Symptoms	Treatment
Mild Hypothermia	99 – 97 F 37 – 36 C	Normal, shivering may begin	Seek dry shelter; replace wet clothing, insulate whole body and head, avoid sweating, use external warmth (bath, fire) only if core above 95 degrees F, give warm sweet drinks and food.
	97 – 95 F 36 – 35 C	Cold sensation, goose bumps, unable to perform complex tasks with hands, shiver can be mild to severe, hands numb.	
Moderate Hypothermia	95 – 93 F 35 – 34 C	Intense shivering, muscle in-coordination becomes apparent, movements slow and labored, stumbling pace, mild confusion may appear alert.	Avoid exercise and external warmth, gently rest; give warm sweet drinks and calories, internal warming via warm moist air, monitor pulse and breathing.
	93 – 90 F 34 – 32 C	Violent shivering persist, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, signs of depression, withdrawn.	
Severe Hypothermia	90 – 86 F 32 – 30 C	Shivering stops, exposed skin blue or puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behavior, but may be able to maintain posture and appearance of awareness.	Medical emergency, give nothing by mouth, wrap in an insulated blanket, avoid rapid rewarming, transfer to hospital immediately.
	86 – 82 F 30 – 28 C	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.	
	82 – 78 F 28 – 25.5 C	Unconscious, heart beat and respiration erratic, pulse may not be palpable.	
	78 – 75 F 25.5 – 24 C	Pulmonary edema, cardiac and respiratory failure, death. Death may occur before this temperature is reached.	

- 1.2.3 Early warning signs of hypothermia:
 - Feeling of being cold and tired;
 - Heavier breathing and increased pulse rate;
 - Tendency to keep moving (e.g., stamping feet, rubbing hands, continued walking/pacing);
 - Goose bumps, holding arms tightly wrapped around the body, hunching of shoulders, and
 - Shivering.
- 1.2.4 Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years after the initial hypothermia episode. Symptoms of hypothermia may include, but are not limited to:
 - Pain in the extremities;
 - Severe shivering and numbness;
 - Low core body temperature;
 - Drowsiness and muscular weakness;
 - Apathy;
 - Mental confusion;
 - Loss of consciousness;
 - Shock, and
 - Decreasing pulse and breathing rate.

2.0 Recommended Treatment for Cold Stress-related Illnesses

- 2.1 Frostbite
 - 2.1.1 Wrap the victim in woollen blanket and keep dry until he or she can be brought inside.
 - 2.1.2 Remove the victim from the cold environment.
 - 2.1.3 Do not rub, chafe, or manipulate frozen parts.
 - 2.1.4 Place the victim in warm water (102°F to 105°F) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold; refreezing can cause significant tissue damage.
 - 2.1.5 Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.
 - 2.1.6 Do not allow the victim to walk if his or her feet are affected.
 - 2.1.7 Have the victim gently exercise the affected parts once they are thawed.
 - 2.1.8 Seek immediate medical attention for thawing of serious frostbite.
- 2.2 Hypothermia
 - 2.2.1 Bring the victim into a warm room or shelter as quickly as possible.
 - 2.2.2 Give artificial respiration and stop any bleeding, if necessary.
 - 2.2.3 If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets, or some other insulation between the victim and the ground.
 - 2.2.4 Remove all wet clothing.
 - 2.2.5 Provide an external heat source, because the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water, or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility

of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.

- 2.2.6 Do not allow the victim to sleep.
- 2.2.7 Give warm, sweet drinks. Do not give alcohol or pain relievers.
- 2.2.8 Keep the victim still. Do not try to walk.
- 2.2.9 Do not rub numb skin.
- 2.2.10 Get medical attention as soon as possible.

Heat Stress

S3AM-113-PR1

1.0 Purpose and Scope

- 1.1 Establishes a Heat Illness Prevention Program to guide employees in preventing heat illness, recognition of the symptoms of heat stress-related illnesses and in taking the appropriate corrective action.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

- 2.1 **Acclimated** – Employees who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat and much of its benefit may be lost if exposure to hot environments is discontinued for a week.
- 2.2 **Chemical Protective Clothing (CPC)** – Apparel that is constructed of relatively impermeable materials intended to act as a barrier to physical contact of the Employee with potentially hazardous materials in the workplace. Such materials include Tyvek® coveralls (all types) and polyvinyl chloride coveralls and rain suits.
- 2.3 **Heat Cramps** – A form of heat stress brought on by profuse sweating and the resultant loss of salt from the body.
- 2.4 **Heat Exhaustion** – A form of heat stress brought about by the pooling of blood in the vessels of the skin and in the extremities.
- 2.5 **Heat Rash** – A heat-induced condition characterized by a red, bumpy rash with severe itching.
- 2.6 **Heat Stress** – The combination of environmental and physical work factors that constitute the total heat load imposed on the body.
- 2.7 **Heat Stroke** – The most serious form of heat stress, which involves a profound disturbance of the body's heat-regulating mechanism.
- 2.8 **Sunburn** – Caused by unprotected exposure to ultraviolet radiation present in sunlight that is damaging to the skin (Refer to *S3AM-121-PR1 Non-Ionizing Radiation*). The injury is characterized by red painful skin, blisters, and/or peeling.
- 2.9 **Unacclimated** – Employees who have not been exposed to hot work conditions for one week or more or who have become heat-intolerant due to illness or other reasons.

3.0 References

- 3.1 S3AM-003-PR1 SH&E Training
- 3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation
- 3.3 S3AM-010-PR1 Emergency Response Planning
- 3.4 S3AM-121-PR1 Non-Ionizing Radiation
- 3.5 S3AM-208-PR1 Personal Protective Equipment
- 3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedures

4.1 Roles and Responsibilities

4.1.1 Managers

- Evaluate the need for heat illness prevention measures and incorporate as appropriate into the Safe Work Plan or Task Hazard Analysis.
- Allocate sufficient resources for the management of heat illness in the field including the provision of water, a shaded break area, and sufficient schedule to allow for breaks.

4.1.2 Safety, Health and Environment (SH&E) Manager

- Provide heat illness awareness training.
- Assist in developing appropriate work-rest schedules.
- Conduct/support incident investigations related to potential heat stress-related illnesses.

4.1.3 Supervisor

- Identify those tasks that may be most impacted by heat stress and communicate the hazard to the assigned Employees.
- Confirm that Employees have been trained on the recognition of heat illness.
- Confirm that this procedure, along with any applicable Safe Work Plan and/or Task Hazard Analysis (and heat exposure control plan that may be contained therein) are made available to affected Employees.
- Confirm that adequate supplies of appropriate fluids are readily available to Employees.
- Confirm that a proper rest area is available.
- Conduct heat illness monitoring, as applicable.
- Implement the work-rest schedule.
- Confirm that first aid measures are implemented once heat stress symptoms are identified.
- Confirm personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.
- Report all suspected heat illnesses.

4.1.4 Employee

- Observe each other for the early symptoms of heat illnesses.
- Maintain an adequate intake of available fluids.
- Be familiar with heat stress hazards, predisposing factors, and preventative measures.
- Report to work in a properly vested and hydrated condition.
- Report all suspected heat stress-related illnesses.

4.2 Restrictions

- 4.2.1 The Buddy System is required when working in high heat conditions; Employees shall not work alone.
- 4.2.2 Employees shall not be exposed to levels exceeding those specified for the given work level and work-rest regimen as listed in *S3AM-113-ATT1 Temperature Thresholds*.
- 4.2.3 Clothing corrections shall be applied in accordance with the tables provided in *S3AM-113-ATT1 Temperature Thresholds*.

4.3 Exposure Controls

4.3.1 It shall be determined whether Employees are or may be exposed to hazardous heat levels. The Supervisor shall:

- Conduct a heat stress assessment to determine the potential for hazardous exposure of Employees. Assessment shall include, but not limited to:
 - o Ambient temperature.
 - o Amount of sunshine (cloudy, clear). Refer to *S3AM-121-PR1 Non-Ionizing Radiation* additional direction concerning ultraviolet radiation exposures.
 - o Other radiant heat sources (e.g. motor, fire, etc.).
 - o Humidity.
 - o Air flow.
 - o Amount or type of physical labor being performed,
 - o Physical condition of the Employees (e.g., acclimated/not)
 - o Protective clothing in use.
 - o Referral to *S3AM-113-ATT1 Temperature Thresholds* to assist in determining whether hazardous heat exposures may exist.
- If potential for hazardous exposure is identified, the Supervisor shall develop and implement a heat stress exposure control plan within the Safe Work Plan and/or Task Hazard Analysis. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.3.2 If Employees are or may be exposed, the Supervisor shall implement engineering controls (e.g., shelters, cooling devices, etc.) to reduce the exposure of Employees to levels below those specified for the given work level and work-rest regimen as listed in *S3AM-113-ATT1 Temperature Thresholds*.

4.3.3 If engineering controls are not practicable, the Supervisor shall reduce the exposure of Employees to levels below those listed in *S3AM-113-ATT1 Temperature Thresholds* by providing administrative controls, including a work-rest cycle or personal protective equipment, if the equipment provides protection equally effective as administrative controls.

4.3.4 If Employees are or may be exposed, the Supervisor shall provide and maintain an adequate supply of cool, fresh, potable water close to the work area for the use of a heat exposed Employee. Water shall be provided (paid) by the project or program; if Employees purchase their own drinking water because water is not otherwise available on site, they shall be reimbursed.

4.3.5 If an Employee shows signs or reports symptoms of heat stress or strain, they shall be removed from the hot environment and treated by an appropriate first aid attendant on site, if available, or by a physician, refer to *S3AM-113-ATT2 Symptoms & Treatment* for more specifics.

4.4 Heat Stress Planning

4.4.1 Heat stress can be a significant site hazard, especially for Employees wearing CPC. To prepare for emergency response planning, refer to *S3AM-010-PR1 Emergency Response Planning* procedure.

4.4.2 The project and site specific risks need to be planned using the SH&E Plan and the Task Hazard Assessments (THA). Refer to the *S3AM-209-PR1 Risk Assessment & Management* procedure.

4.4.3 The heat a worker is exposed to may be a combination of air temperature, radiant heat, and humidity. The WBGT (wet-bulb globe thermometer) is a useful index of the environmental contribution to heat stress. Because WBGT is only an index of the environment, the contributions of

work demands, clothing, and state of acclimatization shall also be accounted for, as described in the following steps.

- Monitor ambient temperatures and conduct heat stress monitoring in accordance with the location specific SH&E Plan. Revise the heat stress monitoring and controls if there are any reports of discomfort due to heat stress.
- Monitor temperatures in each unique environment in which workers perform work (e.g., take WBGT measurements inside truck cabs for truck drivers, and take separate WBGT measurements in the outdoor area where field employees work, etc.). Follow manufacturer's instructions on proper use of the WBGT.
- Determine if individual workers are acclimatized or un-acclimatized. Full heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the activity under those heat-stress conditions is discontinued, or when there is a sustained increase in temperatures of 10 °F (5.6 °C) or more, and a noticeable loss occurs after 4 days. A worker can be considered acclimatized for the purpose of this procedure when they have been exposed to the site conditions (including level of activity) for 5 of the last 7 days.
- Determine the approximate workload of each worker or group of workers. The following examples (Table 1) can be used for comparison:

Table 1
Examples of Activities within Workload Categories

Categories	Example Activities
Resting	Sitting quietly
	Sitting with moderate arm movements
Light	Sitting with moderate arm and leg movements
	Standing with light work at machine or bench while using mostly arms
	Using a table saw
	Standing with light or moderate work at machine or bench and some walking about
Moderate	Scrubbing in a standing position
	Walking about with moderate lifting or pushing
	Walking on level at 3.5 miles/hr (6 km/hr) while carrying 6.6 lbs (3kg) weight load
Heavy	Carpenter sawing by hand
	Shoveling dry sand
	Heavy assembly work on a non-continuous basis
	Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)
Very Heavy	Shoveling wet sand

- Determine the approximate proportion of work within an hour during a typical shift. Typically, the initial work schedule will be 60 minutes of work per hour (100 percent work) with a small break in the morning and afternoon, as appropriate, and a 30-minute lunch break mid-day.
- For workers wearing cloth coveralls (e.g., Nomex fire resistant clothing), add 3 to the measured WBGT. For impermeable clothing, such as Tyvek or Saranex, the WBGT procedures cannot be used. For these situations, workers should begin physiological monitoring as soon as the temperature in the work area exceeds 70°F (21°C).
- Use the collected information to develop appropriate work to rest schedules as detailed in *S3AM-113-ATT1 Temperature Threshold*.

4.4.4 Given the work demands (light, moderate, heavy or very heavy), heat of the work environment, and such aspects as PPE in use, workload will be adjusted appropriately to allow for proper acclimation.

- This is the process by which the body "gets used to" hot work environments. This is achieved by slowly increasing workloads.
- New and returning Employees (absent one week or more) who have not had time to acclimatize may be more susceptible to heat related illnesses, even in seemingly low risk heat exposures.
- All Employees shall be allowed time to acclimatize in the event of a heat wave. All Employees assigned to a new process with additional heat exposures shall be allowed to acclimatize.
- Minimize workload and gradually increase as tolerance is built up. Allow for more frequent breaks.
- While acclimatization normally takes approximately 5 to 7 days, heightened monitoring of these Employees will be maintained for the first 14 days.

4.4.5 Employees shall be instructed in the recognition of heat stress symptoms, the first aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Employees shall be encouraged to immediately report any heat stress that they may experience or observe in fellow Employees. Supervisors shall use such information to adjust the work-rest schedule to accommodate such problems.

4.4.6 Wherever possible, a designated break area should be established in an air conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow Employees to loosen or remove protective clothing, and sufficient seating should be available for all Employees. During breaks, Employees shall be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.

4.5 Symptoms and Treatment

4.5.1 Refer to *S3AM-113-ATT2 Symptoms & Treatment*.

4.5.2 Employees who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin) shall be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water.

4.5.3 Anyone exhibiting symptoms of heat stroke (red dry skin, or unconsciousness) shall be taken immediately to the nearest medical facility. Steps shall be taken to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).

4.5.4 Severe heat stress (heat stroke) is a life-threatening condition that shall be treated by a competent medical authority.

4.6 Prevention

4.6.1 Requirements for working in extreme heat may be triggered by a regulatory established criteria (e.g. CAL/OSHA requires high heat procedures when temperature equals or exceeds 95°F) or as a result of a hazard analysis assessing various contributory factors (refer to *S3AM-113-ATT1 Temperature Thresholds*). Employees working in extreme heat or sun should understand and apply the following guidelines for preventing and detecting heat exhaustion and heat stroke.

- When possible, begin hydrating at least three days prior to working in high heat conditions.
- Review the heat stress exposure control plan within the Safe Work Plan and/or Task Hazard Analysis.
- If the supervisor is not immediately available confirm a reliable method of communication is in place to allow for contact with supervision. In the absence of cellular reception a satellite phone or similar device may be required.

- Take frequent short breaks in areas sheltered from direct sunlight; eat and drink small amounts frequently.
- Try to schedule work for the coolest part of the day, early morning and evening.
- Avoid strenuous physical activity outdoors during the hottest part of the day.
- Avoid sudden changes of temperature. Refer to *S3AM-113-ATT1 Temperature Thresholds*.
- Air out a hot vehicle before getting into it.
- Obtain medical direction if taking diuretics during hot weather (a lower dose may be necessary).
- When working in heat, drink 1 quart of water per hour of work.
- Avoid caffeine and alcohol as they increase dehydration.
- Monitor urine frequency and color to detect dehydration. Refer to the *S3AM-113-ATT3 Dehydration Chart*.
- The Buddy System is required when working in high heat conditions to enable effective communication and cross-observation for indications of heat stress.
- Initiate emergency response procedures when necessary, including contacting emergency medical services as appropriate and in accordance with the Emergency Response Plan.

4.6.2 Personal Protective Equipment

- Review the *S3AM-208-PR1 Personal Protective Equipment* procedure.
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
- Apply sunscreen to exposed skin (SPF 30 or greater, follow directions on label).
- Wear sunglasses with UV protection.
- Pack extra water to avoid dehydration (try freezing water in bottles overnight to help keep the water cooler for longer during the day).

4.7 Work-Rest Schedule Practices

- 4.7.1 Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.
- Two 8-ounce glasses of water should be taken prior to beginning work, then up to 32 ounces (1 quart) per hour during the work shift; fluid replacement at frequent intervals is most effective.
 - The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration and may increase loss of water.
 - If commercial electrolyte drinks (e.g., Gatorade) are used, the drink should be diluted with water, or 8 ounces of water should be taken with each 8 ounces of electrolyte beverage.
- 4.7.2 Additional salt is usually not needed and salt tablets should not be taken.
- 4.7.3 Replacement fluids should be cool and fresh, but not cold.
- 4.7.4 Breaks will be taken in a cool, shaded location, and any impermeable clothing should be opened or removed.
- A relatively cool, shaded area shall be provided for breaks when working in hot environments. For hazardous waste sites, the rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decontamination area so workers can take breaks without going through full decontamination.

- If shade is not available, shaded areas shall be constructed. This same type of canopy can be set up to shade personnel performing various types of work in hot weather.
- Cooling measures other than shade (e.g., misting, air conditioned break areas, air conditioned vehicles, etc.) can be used in lieu of shade provided it can be demonstrated that they are at least as effective in cooling employees.
- Employees should have access to these rest areas at break times and at any other time when suffering from heat illness or believing a preventive recovery period is needed.

4.7.5 Dry clothing or towels will be available to minimize chills when taking breaks.

4.7.6 Manual labor will not be performed during breaks, other than paperwork or similar light tasks.

4.7.7 Other controls that may be used include:

- Scheduling work at night or during the cooler parts of the day (6 am–10 am, 3 pm–7 pm).
- Erecting a cover or partition to shade the work area.
- Auxiliary cooling - wearing cooling devices beneath protective garments, but over any underclothing.
 - o If cooling devices are worn, only physiological monitoring will be used to determine work activity.
 - o These vests typically provide cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.
 - o The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement.
 - o The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly.
- Auxiliary cooling should be considered when the following conditions exist:
 - o Ambient temperature over 80°F (26°C).
 - o Workers are wearing impermeable garments (i.e., Tyvek, Saranex, Chemrel, etc.).
 - o It is desirable to have long work shifts with minimum interruption.

4.8 Evaluating the Work-Rest Schedule's Effectiveness

4.8.1 Once a work-rest schedule is established, the Supervisor shall continually evaluate its effectiveness through observation of Employees for signs/symptoms of heat stress. Have workers assess themselves and their body's reaction to the heat and work conditions (self-assessment), and report any signs or symptoms of heat illness. These can include nausea or dizziness, heat cramps, extreme thirst, or very dark urine.

4.8.2 Measurement or physiological monitoring of each Employee's vitals (e.g., pulse, blood pressure, and temperature) can provide additional information in determining if the schedule is adequate. Refer to *S3AM-113-ATT1 Temperature Thresholds* for additional guidance on when physiological monitoring should be conducted.

4.8.3 Frequency of physiological monitoring is increased or decreased depending upon such factors as worker fitness, acclimatization, temperature of the work environment, type of PPE, etc.

Based on the results of the physiological monitoring and on the workers' self-assessments, the work period may be adjusted as follows:

- The work period may be increased (generally, by 5- to 10-minutes intervals, up to a maximum of 4 hours) if the results of the first 2 hours of the physiological monitoring and the workers' self-assessments indicate that workers are recovering adequately (see below), and on the judgment of the SH&E Manager.
 - The work period shall be decreased if the results of the physiological monitoring and the workers' self-assessment indicate that workers are NOT recovering adequately (see below).
- 4.8.4 If physiological monitoring is conducted, the Employee and/or the SH&E Manager (or appropriate designate) shall measure and record body temperature and pulse rate as described below.
- 4.8.5 Monitor body temperature to determine if Employees are adequately dissipating heat build-up. Ear probe thermometers which are adjusted to oral temperature (aural temperature) are convenient and the preferred method of measurement. Determine work/rest regimen as follows:
- Measure oral body temperature at the end of the work period. Oral body temperatures are to be obtained prior to the employee drinking water or other fluids.
 - If temperature exceeds 99.6°F (37.5°C), shorten the following work period by 1/3 without changing the rest period.
 - If, at the next rest period, temperature still exceeds 99.6°F (37.5°C), the worker should not be allowed to continue work until repeated temperature measurements are in the acceptable range (i.e., less than 99.6°F). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.
 - Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6°F (38.1°C).
- 4.8.6 At the start of the workday each Employee's baseline pulse rate (in beats per minute [bpm]) is determined by taking a pulse count for 15 seconds and multiplying the result by four or by using an automated pulse count device. Pulse rates can then be measured at the beginning of each break period and two minutes thereafter to determine if the rest period allows for adequate recovery.
- Take the radial (wrist) pulse as early as possible in the rest period and determine the worker's heart rate in beats per minute. The heart rate is determined by counting the pulse for ten seconds and multiplying the number by 6 to get the beats per minute. Record this as P1.
 - Wait 2 minutes and repeat the pulse measurement. Record this as P2.
 - If P1 is greater than or equal to 110 beats per minute (bpm) and if (P1 – P2) is less than or equal to 10 bpm (indicating that workers are not recovering adequately), shorten the next work cycle by 1/3 without changing the rest period.
 - At the next rest period, if P1 is still equal to or greater than 110 bpm, and if (P1 – P2) is still less than or equal to 10 bpm, shorten the following work cycle by 1/3 without changing the rest period.
 - At the third rest period, if P1 is still equal to or greater than 110 bpm and (P1 – P2) is still less than or equal to 10 bpm, the worker should not be allowed to continue work until repeated pulse measurements are in the acceptable range (i.e., P1 is less than 110 bpm and (P1 – P2) is greater than 10 bpm). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.
- 4.8.7 Use of an automated or similar blood pressure device will be used to assess each Employee's blood pressure at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:
- If the blood pressure of an Employee is outside of 90/60 to 150/90, then the Employee will not be allowed to begin or resume work; extend the break period by at least five minutes, at the end of which blood pressure rates will be re-measured and the end-of-break criteria again applied.

- 4.8.8 All physiological monitoring of heat stress will be documented using *S3AM-113-FM1 Heat Stress Monitoring Log*.

4.9 Training

- 4.9.1 Employees and their Supervisors that may be exposed to the hazard will be trained and oriented to the hazard and the controls prior to work commencing.
- 4.9.2 Those Employees, including Supervisors, potentially exposed to heat stress will receive training, refer to the *S3AM-003-PR1 SH&E Training* procedure. Training will include, but is not limited to:
- Sources of heat stress (environmental and personal), influence of protective clothing, and importance of acclimatization;
 - How the body handles heat and acclimatization;
 - Recognition of heat-related illness symptoms;
 - Preventative/corrective measures including, but not limited to;
 - o Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.
 - o All Employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
 - First aid procedures for heat stress-related illnesses; and
 - Immediate reporting of any heat-related incident (injury, illness, near-miss), refer to the *S3AM-004-PR1 Incident Reporting, Notifications & Investigation* procedure.

5.0 Records

- 5.1 None

6.0 Attachments

- 6.1 [S3AM-113-ATT1 Temperature Thresholds](#)
- 6.2 [S3AM-113-ATT2 Symptoms & Treatment](#)
- 6.3 [S3AM-113-ATT3 Dehydration Chart](#)
- 6.4 [S3AM-113-FM1 Heat Stress Monitoring Log](#)

Temperature Thresholds

S3AM-113-ATT1

1.0 Work-Rest Schedule

The prevention of heat stress is best performed through Supervisor observation of Employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow Employees to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks shall be determined by the Supervisor based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the Employees (e.g., acclimated/not), and protective clothing being used.

1.1 Establishing a Work-Rest Schedule:

1.1.1 AECOM permits the use of either of two techniques to initially determine an appropriate daily work-rest schedule. These methods are:

- Wet Bulb Globe Thermometer (WBGT) Method: This method is preferred if a WBGT meter is available.
- Adjusted Temperature Method: This method should be used only if WBGT data is not available.

1.1.2 Either procedure will provide the Supervisor with a recommended routine; however, adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

1.2 WBGT Work-Rest Schedule Guidelines:

1.2.1 If the measured WBGT is less than the action limit value, there is little risk of excessive exposure to heat stress, and work can continue.

- Continue to monitor ambient conditions with the WBGT. However, if there are reports of the symptoms of heat-related disorders, then the analysis of little risk should be reconsidered.
- If the measured WBGT is greater than the values in the following two tables, institute heat stress controls, including the associated work-rest cycle, and perform physiological monitoring as described in *S3AM-113-PR1 Heat Stress*.
- Because of the physiological strain associated with very heavy work among less fit workers regardless of WBGT, values are not provided in Table 1 or 2 for continuous work or 75% work – 25% rest regimen. Physiological monitoring should always be implemented under these conditions.

1.2.2 Table 1, the Non-CPC Activities WBGT Chart, is intended for use where personnel are not utilizing Chemical Protective Clothing (CPC). Where workers are required to utilize CPC, Table 2, the CPC Activities WBGT Chart, will be used.

1.2.3 WBGT readings are compared directly with the values of the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 1. Non-CPC Activities WBGT Chart

Work-Rest Regimen	WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85°F (29.4°C)	81°F (27.2°C)	78°F (25.6°C)	
75% Work – 25% Rest	86°F (30°C)	83°F (28.3°C)	81°F (27.2°C)	
50% Work – 50% Rest	88°F (31.1°C)	85°F (29.4°C)	83°F (28.3°C)	81°F (27.2°C)
25% Work – 75% Rest	90°F (32.2°C)	87°F (30.6°C)	86°F (30°C)	85°F (29.4°C)

Modified from ACGIH's 2014 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers.

Table 2. CPC Activities WBGT Chart

Work-Rest Regimen	WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74°F (23.3°C)	70°F (21.1°C)	67°F (19.4°C)	
75% Work – 25% Rest	75°F (23.9°C)	72°F (22.2°C)	70°F (21.1°C)	
50% Work – 50% Rest	77°F (25°C)	74°F (23.3°C)	72°F (22.2°C)	70°F (21.1°C)
25% Work – 75% Rest	79°F (26.1°C)	76°F (24.4°C)	75°F (23.9°C)	74°F (23.3°C)

Modified from ACGIH's 2014 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers.

1.3 Humidex Based Work-Rest Schedule Guidelines

1.3.1 The Humidex method is a simplified way of protecting workers from heat stress. It is an equivalent scale intended to express the combined effects of warm temperatures and humidity. Humidex is used as a measure of perceived heat that results from the combined effect of excessive humidity and high temperature.

1.3.2 This method requires only a local air temperature and relative humidity value. Monitoring shall continue throughout the day for changing conditions. Identify a representative location where measurements can be taken. Measurements should be recorded at least hourly when ambient temperatures and 90°F (32°C) for personnel wearing normal permeable work clothes.

- Step 1: On the Humidex table below, look up the temperature on the left (Celsius is located below RH>) and the relative humidity (RH) on the top. Determine the Humidex value.

F	RH>	100 %	95 %	90 %	85 %	80 %	75 %	70 %	65 %	60 %	55 %	50 %	45 %	40 %	35 %	30 %	25 %	20 %
108	42													55	52	50	48	46
106	41												55	53	51	48	46	44
104	40											55	53	51	49	47	45	43
102	39										55	53	51	49	47	45	43	41
100	38	Step 1 - Determine HUMIDEX VALUE								54	53	51	49	47	45	43	42	40
99	37								54	52	51	49	47	45	44	42	40	38
97	36					57	55	53	52	50	49	47	45	44	42	40	39	37
95	35				56	54	53	51	50	48	47	45	43	42	40	39	37	36
93	34		56	55	53	52	51	49	48	46	45	43	42	40	39	37	36	34
91	33	55	54	53	51	50	48	47	46	44	43	41	40	39	37	36	34	33
90	32	53	51	50	49	48	46	45	44	42	41	40	38	37	36	34	33	32
88	31	50	49	48	47	45	44	43	42	40	39	38	37	35	34	33	32	30
86	30	48	47	46	44	43	42	41	40	39	37	36	35	34	33	31	30	29
84	29	46	45	43	42	41	40	39	38	37	36	35	33	32	31	30	29	28
82	28	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
81	27	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
79	26	39	38	37	36	35	34	33	33	32	31	30	29	28	27	26	25	24
77	25	37	36	35	34	33	33	32	31	30	29	28	27	26	26	25	24	23

- **Step 2:** Place the Humidex value into the Heat Index Adjustment Table below. Determine the applicable adjustments based on the given work or task.

Heat Index Adjustment Table

Step 2 - Risk Factor Adjustment		
Write in value	What is the HUMIDEX value from the table in Step 1?	
Radiant Heat		Adjustment
	Working in full-sun	Add 2
	Working in ½ or partial sun or weak radiant heat source	Add 1
	Working near very hot equipment surfaces or processes	Add 2
Clothing: Pick One Only		
	Short/long sleeve shirt and pants – no overalls	None
	Overalls (e.g., Nomex suit)	Add 3
	Double layer overalls	Add 5
Stop	Impermeable clothing	Perform Physiological Monitoring
Acclimatization		
	Have been working at least 5 of last 7 days in heat stress conditions.	Subtract 4
Work Load & Miscellaneous Factors		
	Light Work (Standing, slow walking)	Subtract 2
	Medium Work (Walking about with moderate lifting or pushing)	None
	Heavy Work (Shoveling dry sand, carrying 50 lbs)	Add 2
	Very Heavy Work (Shoveling wet sand)	Add 3
TOTAL – Compare to Heat Index Response Plan		

- **Step 3:** Compare adjusted Heat Index Total to the Heat Index Response Plan table to obtain guidance for work/rest.

Heat Index Response Plan*

TOTAL NUMBER	Final Step 3 - HEAT INDEX Response
30-33	alert & information & water
34-37	warning & increase water
38-39	75% work - 25% rest & monitor for signs of heat stress
40-41	50% work - 50% rest & monitor for signs of heat stress
42-44	25% work - 75% rest & monitor for signs of heat stress
45+	Perform Physiological Monitoring

* Percent work and rest/recovery are on a per hour basis. Adjustments and subsequent work/rest cycle recommendations are rough guidelines only. No heat stress prediction scheme can replace monitoring of symptoms or a health care practitioners advice in the case of individuals with special medical conditions or predisposing circumstances for heat related illness. Always pay attention to the way workers are feeling. Recuperate if fatigued, nauseated, dizzy or thirsty,

1.4 Adjusted Temperature Work-Rest Schedule Guidelines:

This method can be utilized where WBGT data is not available, and requires only that the ambient temperature be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate humidity and a fully acclimated work force). The adjustments will be made by addition or subtraction to the ambient temperature reading, or changes in table position, as indicated in Table 3. Adjustments are independent and cumulative, all applicable adjustments should be applied. The result is the Adjusted Temperature, which can be compared with the values in Table 4 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest schedule.

Table 3. Temperature Adjustment Factors

Time of Day	
Before daily temperature peak ¹	+2°F (+1.11°C)
10 am – 2 pm (peak sunshine)	+2°F (+1.11°C)
Sunshine	
No clouds	+1°F (+0.56°C)
Partly Cloudy (3/8 – 5/8 cloud cover)	-3°F (-1.67°C)
Mostly Cloudy (5/8 – 7/8 cloud cover)	-5°F (-2.78°C)
Cloudy (>7/8 cloud cover)	-7°F (-3.89°C)
Indoor or nighttime work	-7°F (-3.89°C)
Wind (<i>ignore if indoors or wearing CPC</i>)	
Gusts greater than 5 miles per hour at least once per minute	-1°F (-0.56°C)
Gusts greater than 10 miles per hour at least once per minute	+2°F (+1.11°C)
Sustained greater than 5 miles per hour	-3°F (-1.67°C)
Sustained greater than 10 miles per hour	-5°F (-2.78°C)
Humidity (<i>ignore if wearing CPC</i>)	
Relative Humidity greater than 90%	+5°F (+2.78°C)
Relative Humidity greater than 80%	+2°F (+1.11°C)
Relative Humidity less than 50%	-4°F (-2.23°C)
Chemical Protective Clothing (CPC)	
Modified Level D (coveralls, no respirator)	+5°F (+2.78°C)
Level C (coveralls w/o hood, full-face respirator)	+8°F (+4.45°C)
Level C (coveralls with hood, full-face respirator)	+10°F (+5°C)
Level B with airline system (hooded chemical resistant clothing)	+9°F (+5.56°C)
Level B with SCBA (hooded chemical resistant clothing)	+9°F (+5.56°C) and right one column ²
Level A (totally encapsulating chemical protective suit)	+14°F (+7.78°C) and right one column
Other	Specified in the HASP
Miscellaneous	
Unacclimated work force	+5°F (+2.78°C)
Partially acclimated work force	+2°F (+1.11°C)
Working in shade	-3°F (-1.67°C)
Breaks taken in air conditioned space	-3°F (-1.67°C)

**For complete descriptions of Level A through D Protective Clothing refer to
Unites States 29 CFR 1910.120 Appendix B**

¹ This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

² Locate the proper column based on work rate, then move one column to the right (next higher work rate) before locating the corresponding adjusted temperature.

Table 4. Work-Rest Schedule Based on Adjusted Temperature

Work-Rest Regimen	Adjusted Temperature			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
No specified requirements	< 80°F (22.67°C)	< 75 (23.88°C)	< 70 (21.11°C)	< 65 (18.33°C)
15 minute break every 90 minutes of work	80°F – 90°F (22.67°C) - (32.22°C)	75 – 85 (23.88°C) - (29.44°C)	70 – 80 (21.11°C) - (22.67°C)	65 – 75 (37.77°C) - (23.88°C)
15 minute break every 60 minutes of work	>90 – 100 (32.22°C) - (37.77°C)	> 85 – 95 (23.88°C) - (35°C)	>80 – 85 (22.67°C) - (23.88°C)	>75 – 80 (23.88°C) - (22.67°C)
15 minute break every 45 minutes of work	>100 – 110 (37.77°C) - (43.33°C)	>95 – 100 (35°C) - (37.77°C)	>85 – 90 (23.88°C) - (32.22°C)	>80 – 85 (22.67°C) - (23.88°C)
15 minute break every 30 minutes of work	>110 – 115 (43.33°C) - (46.11°C)	>100 – 105 (37.77°C) - (40.55°C)	>90 – 95 (32.22°C) - (35°C)	>85 – 90 (23.88°C) - (32.22°C)
15 minute break every 15 minutes of work	>115 – 120 (46.11°C) - (48.88°C)	>105 – 110 (40.55°C) - (43.33°C)	>95 -100 (35°C) - (37.77°C)	>90 – 95 (32.22°C) - (35°C)
Stop Work	>120 (48.88°C)	>110 (43.33°C)	>100 (37.77°C)	>95 (35°C)

Note: Time spent performing decontamination or donning/doffing CPC should not be included in calculating work or break time lengths.

Symptoms & Treatment

S3AM-113-ATT2

1.0 Heat Illness Symptoms

1.1 The following are four stages of heat-related illness:

1.1.1 Heat Rash

Heat rash (prickly heat) may result from continuous exposure to heat or humid air. It appears as red papules (elevated skin lesion), usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by un-evaporated sweat. The papules may become infected unless treated.

1.1.2 Heat Cramps

Heat cramps are painful muscle cramps caused by heavy sweating and inadequate electrolyte replacement due to over-exertion in extreme heat. Symptoms include:

- Muscle spasms; and
- Pain in the hands, feet, and abdomen.

1.1.3 Heat Exhaustion

Heat exhaustion is the next stage. Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Symptoms include:

- Cool, moist, pale, flushed or red skin;
- Heavy sweating;
- Headache;
- Nausea or vomiting;
- Dizziness;
- Exhaustion;
- Mood changes (irritable, or confused/can't think straight), and
- Fainting

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core temperature may be elevated, but not higher than 104°F (40°C). It is important to recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

1.1.4 Heat Stroke

Heat exhaustion can sometimes lead to heat stroke, the most serious form of heat stress, which can be fatal and requires emergency treatment. Heat stroke happens when body temperature regulation fails and body temperature continues to rise to critical levels, often to 105 degrees Fahrenheit (°F) (40.5 degrees Celsius [°C]) or higher. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Symptoms of heat stroke:

- Vomiting;
- Decreased alertness level or complete loss of consciousness;
- High body temperature (sometimes as high as 105°F [40.5°C]);
- Red, hot, usually dry skin;
- Lack of or reduced perspiration;
- Skin may still be moist or the victim may stop sweating and the skin may be red, hot, and dry;

- Rapid, weak pulse or rapid, strong pulse;
- Rapid, shallow breathing;
- Nausea;
- Dizziness and confusion; and
- Coma.

2.0 Recommended Treatment for Heat Stress-related Illnesses

2.1 Heat Rash

2.1.1 Treatment for heat rash includes:

- Shower after work, dry off thoroughly, and put on clean, dry underwear and clothes;
- Try to stay in a cool place after work;
- If, in spite of this, you develop heat rash, contact WorkCare.

2.2 Heat Cramps

2.2.1 Treatment for heat cramps includes:

- Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat these steps if necessary;
- Take more frequent breaks and drink more water;
- Move victim to a cool place;
- Administer drinks of cool water;
- Apply manual pressure to cramped muscles;
- Once spasms disappear, you may return to work;
- Seek medical attention if symptoms are not alleviated or if more serious problems are indicated.

2.3 Heat Exhaustion

2.3.1 Treatment of heat exhaustion includes:

- Get out of the sun to a cool location and drink cool water, a little at a time;
- Remove or loosen tight clothing and elevate the feet;
- If you are nauseated or dizzy, lie down;
- Move the victim to a cool place, administer drinks of cool water and fan to cool;
- Seek medical attention immediately.

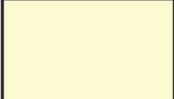
2.4 Heat Stroke

2.4.1 Treatment of heat stroke, or if a person's temperature exceeds 102°F (38.9 °C) includes:

- Call for immediate medical help and then try to lower the temperature as quickly as possible:
 - o Apply cool (not cold) water the person's whole body, then fan the person;
 - o Wrap in wet sheet;
 - o If available, use cold packs under arms, neck, and ankles;
 - o Body temperature is measured frequently, often constantly. To avoid overcooling, cooling is stopped when the body temperature is reduced to about 102°F (38°C);
- Do not give aspirin or acetaminophen to reduce the temperature;
- Treat as a true medical emergency. Seek medical help immediately;
- Protect from injury during convulsion;
- Ensure that the person's airway is open;
- Transfer to a medical facility immediately.

GUIDANCE TOOL FOR MONITORING DEHYDRATION

URINE COLORATION CHART

					
1	2	3	4	5	6
Target		Dehydration		Severe Dehydration	
CONTINUE DRINKING WATER TO MAINTAIN CURRENT HYDRATION LEVELS.		INCREASE WATER CONSUMPTION TO IMPROVE HYDRATION LEVELS, INCREASE BREAKS FREQUENCY, TAKE BREAKS IN A COOL SHADED AREA.		STOP WORK! FIND A SHADED AREA AND BEGIN TO DRINK COOL TO ROOM TEMPERATURE WATER SLOWLY AND STEADILY.	

PREVENTING DEHYDRATION

- Start hydrating at least 3 days prior to working in high heat conditions
- Always bring enough water to maintain hydration. CalOSHA requires consuming 1 quart per hour of your work shift - more may be needed

Note: This information is guidance only and should not supersede the recommendation or instruction of a personal physician or medical professional. Contact your physician or medical professional if you have a personal medical condition or take medication for a personal condition which may be adversely affected by dehydration. Urine color can be affected by medications, vitamins and or other personal health conditions.

Americas

Heat Stress Monitoring Log

S3AM-113-FM1

The purpose of this form is to monitor employees for heat illness when applicable. It is the responsibility of the Foreman or Supervisor-in-Charge to ensure that each person completes the required information.

Project Name:			Foreman/Supervisor:						Work/Rest Schedule¹: IN (min) OUT (min)							
Date:	Water Provided¹		Acclimated²		Initial Vitals³	Vital Signs and Time In/Out³			Celcius ☐ / Farenheit ☐ (select one)							
Employee Name	Yes	No	Yes	No	Vitals	In (P ₁)	Out (P ₁)	Vitals	In (P ₁)	Out (P ₁)	Vitals	In (P ₁)	Out (P ₁)	Vitals	In (P ₁)	Out (P ₁)
					P			P			P			P		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		
					P			P			P			P		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		
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					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		

- Each Employee should be provided a sufficient amount of water or sports drink before entering the hot zone. Drinks such as coffee and cola should be discouraged.
- An Employee is "acclimated" if he/she has worked in a hot environment for at least 5 - 7 consecutive days. If an Employee is acclimated, check "Yes." If an Employee is not acclimated, check "No" and reduce the "Min In" by 50 percent for that Employee until the 5 - 7 -day period is reached.
- "Vitals" refers to Employee vital signs (e.g., pulse [P], blood pressure [BP], body temperature [Temp], etc.). Initial vitals must be taken and recorded before the start of work and at each break period, or as specified in the Heat Stress Exposure Control Plan.

Heat Stress Monitoring Log (S3AM-113-FM1)

Revision 1 December 15, 2016

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Non-Ionizing Radiation

S3AM-121-PR1

1.0 Purpose and Scope

- 1.1 Provides the requirements and guidelines to control occupational and public exposure to non-ionizing radiation, including lasers and radiofrequency (RF), infrared (IR), and ultraviolet (UV) radiation.
- 1.2 This procedure applies to all AECOM Americas employees and operations, and any other entity and its personnel contractually required to comply with this document's content, except where local or governmental regulations are more stringent.

2.0 Terms and Definitions

- 2.1 **Controlled Environment** – An area where the occupancy and activity of those within is subject to control and supervision for the purpose of protection from radiation hazards.
- 2.2 **Hazard Distance** – Distance from a radiofrequency emitter at which the power density equals the Uncontrolled Environment Maximum Permissible Exposure Limit power density level as established by the latest edition of the ANSI C95.1.
- 2.3 **ANSI Z136.1 Safe Use of Lasers** – American National standard issued applicable to the safe use of lasers and laser systems emitting laser radiation in the wavelength range 180 nanometres to 1 millimetre. The standard defines the classification of lasers (Class 1, 1M, 2, 2M, 3R, 3B and 4) based on Accessible Emission Limit (AEL) and viewing conditions.
- 2.4 **Infrared (IR)** – Electromagnetic radiation having a wavelength just greater than that of the red end of the visible light spectrum but less than that of microwaves. Infrared radiation has a wavelength from about 800 nm to 1 mm, and is emitted particularly by heated objects
- 2.5 **Laser** – An acronym for Light Amplification by Stimulated Emission of Radiation.
- 2.6 **Maximum Permissible Exposure (MPE) Limits** – The level of exposure which is considered as the limit between safe and potentially harmful.
- 2.7 **Non-ionizing Radiation** – Any type of electromagnetic radiation that does not carry enough energy to ionize atoms or molecules. Examples include radiofrequency radiation, microwave radiation, ultraviolet radiation, visible light, infrared radiation, lasers, static electric and magnetic fields, etc.
- 2.8 **Radio frequency (RF)** – Any of the electromagnetic wave frequencies that lie in the range extending from around 3 kHz to 300 GHz, and includes frequencies used for communication signals (e.g. radio, cell-phone, etc.) or radar signals.
- 2.9 **Ultraviolet (UV)** – Electromagnetic radiation having wavelengths between that of ordinary, visible violet light that of x-rays. Ultraviolet radiation is made up of three types of rays; A (UVA), B (UVB), and C (UVC). UV radiation is present in sunlight, and also produced by electric arcs and specialized lights (e.g. mercury-vapor lamps, black lights).
- 2.10 **Uncontrolled Environment** – Locations where there is the exposure of individuals who have no knowledge or control of their exposure.

3.0 References

- 3.1 S3AM-003-PR1 SH&E Training
- 3.2 S3AM-120-PR1 Radiation
- 3.3 S3AM-128-PR1 Medical Screening & Surveillance
- 3.4 S3AM-208-PR1 Personal Protective Equipment

- 3.5 S3AM-209-PR1 Risk Assessment & Management
- 3.6 S3AM-325-PR1 Lockout Tagout
- 3.7 S3AM-332-PR1 Hot Work

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Corporate SH&E Management System & Prequalification Manager

The SH&E Department will maintain this procedure and include it in the annual review of the AECOM Americas SH&E procedures.

4.1.2 SH&E Manager (or designee)

The SH&E Manager will provide technical guidance to projects that involve the use/survey of non-ionizing sources as well as identifying the proper controls to mitigate employee exposure to non-ionizing radiation sources, including UV radiation. In addition, SH&E Managers will:

- Review and approve all exposure plans, such as Non-Ionizing Radiation Protection Plans (NIRPP);
- Conduct non-ionizing radiation hazard assessments;
- Confirm applicable awareness training on non-ionizing radiation hazards is available to project teams. Refer to *S3AM-003-PR1 SH&E Training*;
- Authorize the use of a Class 3B and 4 lasers.

4.1.3 Manager

Managers are responsible for the overall safety and planning for a project. Managers are also responsible for:

- Verifying that the presence of non-ionizing radiation sources at project work sites are identified in the applicable SH&E Plan and Task Hazard Assessment (THA) prior to commencing field activities;
- Addressing and controlling potential non-ionizing radiation hazards through consultation with the SH&E Manager, subject matter experts (as appropriate), and/or development of a NIRPP;
- Verifying incident and injury reporting procedures are followed when a suspected overexposure to non-ionizing radiation, an incident of sunburn, or other excessive non-ionizing radiation exposure occurs in the workplace;
- Monitoring employee compliance with the requirements of this policy;
- Confirming employees complete non-ionizing radiation awareness training as directed by the SH&E Manager.

4.1.4 Employee

- Will not disturb or handle any non-ionizing radiation sources or work in any identified non-ionizing radiation hazard area (e.g., Controlled Environment) without appropriate training and safety procedures;
- Will work in accordance with all established manufacturer, client, and NIRPP requirements;
- Will identify both known and suspected non-ionizing radiation sources on the THA and report any change in site conditions related to non-ionizing radiation sources to the Manager;
- Will immediately notify the Manager of the presence or suspected presence of previously unidentified non-ionizing radiation sources in the workplace, and cease all work activities involving potential exposure to non-ionizing radiation until further direction is received;
- Will use suitable personal protective equipment to the non-ionizing radiation hazards.

4.2 Hazard Assessment

4.2.1 AECOM will identify and assess the hazards associated with work where the potential exists for employees to be exposed to laser radiation or other non-ionizing radiation sources, develop appropriate elimination and control measures, and document this in the location or project specific SH&E Plan.

- If routine exposures to laser radiation or other non-ionizing radiation sources are expected, an appropriate plan, such as a Non-Ionizing Radiation Protection Plan (NIRPP) should be developed. The plan (e.g. NIRPP) may be included in the location or project specific SH&E Plan;
- Consultation with subject matter experts may be necessary depending upon the extent, number, and type of non-ionizing radiation (e.g., Laser Safety Officer);
- Task specific hazards and associated controls shall also be identified in the respective THA;
- Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.2.2 In addition to the SH&E Plan, appropriate personal protective equipment will be identified and documented in the THA or other relevant hazard assessment documentation.

4.2.3 AECOM will develop and implement an appropriate NIRPP to control identified hazards where the potential to exceed the applicable Maximum Permissible Exposure (MPE) limits exist.

4.3 Laser Protection Requirements

4.3.1 Only qualified and trained employees will be assigned to install, adjust, and operate laser equipment for surveys, alignment/grade-checks, tunnel work, etc.

4.3.2 Laser equipment will bear a label to indicate maximum power output, ANSI class, and beam spread.

4.3.3 Looking into the primary beam is prohibited, and care will be taken to avoid looking at specular reflections of the beam, including those from lens surface work.

4.3.4 Where direct or reflected laser light greater than 0.005 watts (5 milliwatts) for $\geq \frac{1}{4}$ second exists, employees will be provided with laser safety goggles that will protect them for the specific wavelength of the laser and be of an optical density (OD) adequate for the energy involved. The laser safety goggles will be selected in accordance with the requirements of ANSI Z136.1-2014 (or the most current edition).

4.3.5 Operation of an ANSI Class 3B or 4 laser should be assessed for exposure hazards and whether medical surveillance is appropriate. Refer to *S3AM-128-PR1 Medical Screening & Surveillance*.

4.3.6 Use of an ANSI Class 4 laser requires the approval of the SH&E Manager.

4.3.7 All protective goggles will bear a label identifying the following data:

- The laser wavelength for which use is intended;
- The optical density of that wavelength;
- The visible light transmission.

4.3.8 Class 1 Lasers

- Safe for the unprotected eye and through optical instruments (prescription lenses, telescopes, beam reducers, etc.);
- Very low power lasers or enclosed lasers;
- MPE is never exceeded, even for very long exposure (hours), or with the use of optical instruments;
- Nominal Hazard Zone: none.

4.3.9 Class 1M Lasers

- Safe for the unprotected eye only, but potentially hazardous when optical instruments are used;
- Medium power lasers either collimated with a large beam or highly divergent;
- MPE can be exceeded when using optical instruments;
- Nominal Hazard Zone: none for the unprotected eye.

4.3.10 Class 2 Lasers

- Safe for unintended exposure, (less than 0.25 seconds) but hazardous when looking at for more than 0.25 seconds;
- Visible (wavelength of 400–700 nanometers) low power lasers;
- MPE is not exceeded provided the viewings are accidental only. MPE calculation assumes the blink reflex will stop the light after 0.25 second;
- Nominal Hazard Zone: none for accidental exposure.

4.3.11 Class 2M Lasers

- Safe for the unprotected eye when the exposure is unintended, (less than 0.25 seconds) but hazardous when looking at for more than 0.25 seconds or when optical instruments are used;
- Visible (wavelength of 400–700 nanometers) medium power lasers either collimated with a large beam or highly divergent;
- MPE is not exceeded provided the viewings are accidental only and only with unprotected eyes. MPE calculation assumes the blink reflex will stop the light after 0.25 seconds. Using optical instruments might bring the exposure above the MPE as well;
- Nominal Hazard Zone: none for accidental exposure to the unprotected eye.

4.3.12 Class 2M Lasers and Greater

- Areas where a Class 2M or higher, non-enclosed path laser beam is in use will be posted with standard laser-warning placards;
- Beam shutters or caps will be used, or the laser turned off, when laser transmission is not actually required. When the laser is left unattended for a period of time (e.g., >5 minutes), such as during the lunch hour, overnight, or at change of shifts, the laser will be turned off;
- Only mechanical or electronic means will be used as a detector for guiding the internal alignment of the laser. Aligning the laser with the unprotected eye is prohibited;
- The laser beam will not be directed at employees. Laser units will be set above or below the heads of employees;
- Employee exposure will be controlled to stay within the MPE limits specified in ANSI Z136.1-2014 (or the most current edition).

4.3.13 Class 3R Lasers

- Unsafe, except when handled carefully by experienced users. Accidental short exposure is considered as a small hazard;
- Low power lasers;
- MPE can be exceeded up to 5 times;
- Nominal Hazard Zone: hazard area for the eye, none for the skin.

4.3.14 Class 3B Lasers

- Unsafe without exception, laser safety goggles shall be worn within the nominal hazard zone. Focused lasers of this class are a potential fire hazard;

- Medium power lasers;
- MPE is exceeded more than 5 times. Skin MPE is not generally exceeded, except at focus;
- Nominal Hazard Zone: hazard area for the eye, none for the skin.

4.3.15 Class 4 Lasers

- Dangerous, Personal Protective Equipment (PPE) for eyes and skin shall be worn within the nominal hazard zone. Class 4 lasers are fire hazards as well. Diffuse reflections may be hazardous;
- High power lasers;
- Ocular and skin MPE are exceeded. Diffuse reflections exceed the MPE;
- Nominal Hazard Zone: hazard area for the eye and for the skin.

4.4 Radiofrequency Radiation Protection

4.4.1 Reduction in radiofrequency (RF) exposures can be accomplished through the implementation of appropriate administrative, work practice and engineering controls. Should routine occupational RF exposures be part of a project, a suitable plan shall be developed such as an NIRPP.

4.4.2 Generally, where RF emitters are identified, employees will:

- Remain outside any demarcated area where an RF hazard exists;
- Remain within the General Public exposure region;
- If the preceding requirements cannot be met or determined, AECOM will obtain a hazard assessment from the emitter's operator for controlling entity and provide it to the SH&E Manager for evaluation and determination of the relevant hazard mitigation measures.

4.4.3 If the above information is not available, an RF emitter survey will be required to assess the potential exposure hazards. An RF emitter survey shall be performed by an individual trained to effectively assess RF exposures.

4.4.4 Unless using an RF meter under the direction of an individual trained to effectively assess RF exposures, employees will not enter any area which is located within the RF hazard distance identified by the RF emitter survey. AECOM personnel may enter a controlled area if the emitter has been de-energized and locked-out using standard Lockout/Tagout procedures in accordance with *S3AM-325-PR1 Lockout Tagout*.

4.5 Infrared Radiation Protection

4.5.1 Infrared (IR) radiation may be encountered during furnace operations, pouring, casting, hot dipping, laser and high-intensity light sources, curing, annealing and plastic welding.

4.5.2 Performance of welding and oxygen/acetylene cutting operations (torch cutting, brazing, welding) involves the use of an exposed high-temperature flame. This flame produces infrared (IR) radiation and UV radiation at the welding location which can cause cataracts, skin cancer, and thermal burns to the welder or other persons located nearby.

4.5.3 Skin Protection

- Long sleeve, flame-resistant shirts and/or forearm length Nomex gloves will be worn;
- Leather welder's apron or equivalent protection;
- Long pants shall be worn during any hot work task;
- Welding screens shall be utilized where feasible to protect the general public or other unprotected employees.

4.5.4 Eye Protection

- A welder's helmet or goggles with the appropriate lens shade will be worn. Refer to

S3AM-208-PR1 Personal Protective Equipment.

4.6 Ultraviolet Radiation Protection

- 4.6.1 Broad-spectrum UV radiation is classified as a known human carcinogen. UV radiation can cause harmful effects from both chronic and acute exposures including reddening of the skin (regardless of skin tone), accelerated skin aging, and damage to the eyes (e.g., cataracts, retinal burns, or welder's flash), and sunburn. Employees may be exposed to UV radiation from natural sunlight or manmade sources such as germicidal lamps (e.g., UV groundwater treatment systems) and welding.
- 4.6.2 While not required, the completion of an exposure or UV risk assessment will assess the risk posed by UV at the site. Such an assessment can be included in the SH&E plan and as part of a Task Hazard Assessment (THA). Special consideration should be given to work activities at higher elevations as the intensity of UV exposures are significantly higher than at lower elevations. Typically, UV exposure can increase 4-5% for every 1000 feet ascended. Also, some medications (e.g., Tetracycline) can increase sensitivity to UV exposure.
- 4.6.3 Control measures will be implemented at a worksite according to the conditions and work performed.
- 4.6.4 Engineering Controls
- Operations producing IR or UV radiation may be segregated or separated from other operations (e.g. use of automated systems, walls, screens, etc.);
 - Employees will be encouraged to maximize use of the shade provided by trees, buildings, and other structures;
 - Where there is limited access to natural shade, fixed or portable shade structures will be provided where practical;
 - It is acknowledged that the provision of shade does not provide total protection from UV; therefore, it is recommended that outdoor workers adopt personal protection strategies such as protective clothing, sunscreen, and the wearing of hats in addition to using shade.
- 4.6.5 Administrative Controls
- Consideration will be given to the reorganization of outdoor work programs to reduce UV exposure including, but not limited to:
- Use of the UV Index to assess UV hazards;
 - Rescheduling work hours to enable workers to start earlier during May-September;
- The UV Index, shown in Table 1, can help employees be aware of the expected level of UV radiation exposure on any given day.

Table 1. UV Index

Exposure Category	Index Number	Sun Protection Messages
Low	< 2	Wear sunglasses on bright days. In winter, reflections off of snow can nearly double UV strength. If you burn easily, cover up and use sunscreen.
Moderate	3-5	Take precautions, such as covering up and using sunscreen.
High	6-7	Protection against sunburn is needed.
Very High	8-10	Take extra precautions. Unprotected skin will be damaged and can burn quickly.
Extreme	11+	Take all precautions. Unprotected skin can burn in minutes.

4.6.6 Personal Protective Equipment

Employees who work outdoors shall provide and utilize personal outer clothing (e.g. shirt and trousers) that meets the established general clothing requirements per *S3AM-208-PR1 Personal Protective Equipment*. For those circumstances where the outer clothing requirements exceed the general clothing requirements, AECOM will provide the necessary clothing. The selection of appropriate protective clothing will take into account both the need to block UV and the need to reduce the effects of heat.

- Protective Clothing
 - o Full length trouser pants and shirts that cover shoulders at a minimum (where practical, the fabric will have a close weave);
 - o Where possible, clothing will be lightweight, loose fitting and have a collar;
 - o Clothing and head wear with a sun (UV) protection factor (SFP) is encouraged but not required.
- Secondary hazards such as fire resistance will be considered.
- Head, Face, and Neck Protection
 - o Hats provide shade and the larger the brim the greater the amount of shade that is provided;
 - o Full brim hard hats are recommended (for additional protection, neck flaps are recommended);
 - o In circumstances where the wearing of a broad-brimmed hard hat causes difficulties due to its size, sunscreen and other protective measures will be used.
- Eye Protection
 - o Wrap-around, close-fitting, large safety glasses will reduce the amount of UV and glare that may pass around the edges of the glasses (the color or darkness of the lenses does not indicate the level of UV protection; therefore, verification with the manufacturer should be performed);
 - o Safety glasses shall provide the level of protection appropriate to the potential non-ionizing radiation hazard exposures;
 - o For hot work activities that may produce ultraviolet radiation, eye protection shall utilize the proper welding shade.
- Sunscreen
 - o Sunscreen does not offer complete protection against the sun and should always be used in conjunction with other protective measures;
 - o A broad spectrum and water-resistant sunscreen with a SPF of 30+, or a rating of no less than three stars, will be provided;
 - o Expiration dates on the sunscreen will be regularly checked to confirm it has not expired per the manufacturer's instructions;
 - o Sunscreen should be placed in an easily accessible location and employees instructed on the correct application and use;
 - o Sunscreen should be generously applied to all areas of exposed skin at least 20 minutes before going outside and reapplied every two hours, or as needed by the work conditions.

4.7 Non-ionizing Radiation Training Program

- 4.7.1 Employees will receive training where the need for non-ionizing radiation control measures has been identified in the SH&E Plan and if developed, the Non-Ionizing Radiation Protection Plan.

- 4.7.2 Awareness training on the applicable non-ionizing radiation source will be provided to employees prior to the start of work in the area where the hazard exists as well as when employees are required to enter non-ionizing radiation Controlled Environments. Training curricula will be determined by the SH&E Department.

5.0 Records

- 5.1 Training records shall be maintained in accordance with *S3AM-003-PR1 SH&E Training*. RF emitter surveys will be maintained in applicable project files.

6.0 Attachments

- 6.1 None

1.0 Purpose and Scope

- 1.1 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content where corrosive and/or reactive materials are used or stored.
- 1.2 The purpose of this procedure is to protect employees from the hazards of corrosive and reactive materials. This procedure considers a corrosive material as one that has a pH less than 2.0 (acid), or greater than 12.5 (base). A reactive material is a chemical that may be sensitive to shock, or may react with air or water depending upon its makeup.

2.0 Terms and Definitions

- 2.1 None

3.0 References

- 3.1 S3AM-115-PR1 Hazardous Materials Communication
- 3.2 S3AM-116-PR1 Hazardous Materials Shipping
- 3.3 S3AM-123-PR1 Respiratory Protection
- 3.4 S3AM-208-PR1 Personal Protective Equipment

4.0 Procedure

- 4.1 Implementation of this procedure is the responsibility of the Manager directing activities of the facility, site, or project location.
- 4.2 Appoint a responsible person who will:
- 4.2.1 Inspect storage areas periodically.
 - 4.2.2 Monitor the quantity of corrosive and reactive materials on site, as well as that of incoming materials.
 - 4.2.3 Review work practices that involve corrosive and reactive materials.
- 4.3 Require that all employees working with corrosive or reactive materials, or who may be exposed to such materials, are trained in accordance with *S3AM-115-PR1 – Hazardous Materials Communication*.
- 4.4 Control the use of corrosive and reactive materials by AECOM personnel.
- 4.4.1 Order only those materials and quantities that are needed to complete a job.
 - 4.4.2 Check incoming corrosive and reactive materials for proper labeling in accordance with *S3AM-115-PR1 Hazardous Materials Communication*.
 - Label materials, if needed, as they arrive on site.
 - Mark reactive materials containers with the date of receipt of the chemical.
 - 4.4.3 Check incoming corrosive and reactive materials for safety data sheets (SDS). If SDSs are not provided or are already on file, order them from the manufacturer, distributor, or vendor.
 - 4.4.4 Add incoming corrosive and reactive chemicals to the hazardous materials inventory, if not already present, following procedures set forth in *S3AM-115-PR1 Hazardous Materials Communication*.

- 4.4.5 Do not store any quantity of corrosive or reactive materials in an office (with the exception of limited quantities of consumer products). These materials are to be stored off site, or at an on-site laboratory or storage area.
- 4.5 Store corrosive and reactive materials as indicated in the MSDS:
 - 4.5.1 In a cool, dry environment, free from extremes of temperature and humidity.
 - 4.5.2 In a manner that separates them from other materials (including flammables and oxidizers) and from each other.
 - Separate acids and bases.
 - Separate reactive materials from acids and bases, and protect from contact with water.
 - 4.5.3 On materials that are acid-resistant (Teflon-coated, plastic, etc.) for small containers.
 - 4.5.4 Covered, not stacked on one another, on acid-resistant material for carboys (approximately 5 gallons/22 liters).
 - 4.5.5 On individual racks or securely blocked on skids, with closure (plug) facing upward to prevent leakage from drums.
- 4.6 Require that labeling and signage are in place.
 - 4.6.1 Label containers with the appropriate warning word to indicate the hazard, such as: DANGER; WARNING; CAUTION; CORROSIVE; OXIDIZER.
- 4.7 Use corrosive and reactive materials appropriately.
 - 4.7.1 Prior to use and in accordance with MSDS, safe-handling procedures shall be developed for each operation, and type and concentration of the chemical. In all cases, review the MSDS and product information before use.
 - 4.7.2 Follow *S3AM-208-PR1 Personal Protective Equipment* when working with or around corrosive and reactive materials. Review the MSDS for the chemical used to determine the specific type of PPE needed, to include at a minimum:
 - Chemical-splash goggles
 - Chemical-resistant gloves
 - Chemical-resistant apron
 - 4.7.3 Obtain medical care immediately in the event of:
 - Skin or eye exposure (e.g., splash) to corrosive liquids
 - Inhalation of vapors of corrosive liquids that cause respiratory discomfort.
 - 4.7.4 Require an eyewash station to be located in all areas where acids or bases are used. Safety showers shall be nearby if significant acid or base quantities are involved.
 - Place emergency eyewashes and showers in accessible locations that require no more than 10 seconds to reach, and are in a travel distance no greater than 25 feet (7.5 meters) from the hazard.
 - Keep the areas surrounding eyewashes and safety showers free of stored materials or debris at all times.
 - Mark emergency eyewashes and showers with a highly visible sign.
 - Require the area around emergency eyewashes and showers to be well lighted and visible.
 - Where portable eyewash units are used, a process shall be in place to change the water and clean the unit, as required by the manufacturer's instructions.
 - Require emergency showers and shower/eyewash combinations connected to a self-contained water supply to deliver a minimum 20 gallons (85 liters) per minute for 15 minutes.

- Require emergency showers and shower/eyewash combinations permanently connected to a potable water supply to deliver at least 30 gallons (127.5 liters) per minute continuously.
 - Require emergency eyewashes to be capable of delivering to the eyes not less than 0.4 gallon (1.5 liters) per minute for 15 minutes.
- 4.8 Be prepared to clean up spills of corrosive and reactive materials.
- 4.8.1 Have a written spill response plan in place before materials are stored on site.
 - 4.8.2 Have commercial spill kits available for cleanup of small quantities of materials. At a minimum, kits should contain appropriate protective clothing (including full-body suits, gloves, and boots) and spill control equipment (including absorbents, pillows, shovels, containers, etc.).
 - 4.8.3 Where necessary, confirm that appropriate respiratory protection equipment is provided to spill responders. For additional information, see *S3AM-123-PR1 Respiratory Protection*.
 - 4.8.4 Clean up or respond to spills promptly.
 - 4.8.5 Confirm that personnel responding to a spill have been trained in the hazards associated with the spilled material, as well as use of the spill control equipment, including PPE required for the task.
 - 4.8.6 Do not use combustible organic materials such as sawdust, excelsior, wood chips and shavings, paper, rags, or burlap bags to absorb or clean up spills.
- 4.9 Develop a waste management plan and procedures, including procedures for collection, storage, labeling, pick-up and transport, and final disposal.
- 4.10 Dispose of corrosive and reactive materials appropriately.
- 4.10.1 Segregate organic acids, inorganic acids, and basic wastes.
 - 4.10.2 Contract hazardous waste disposal services should be obtained, as necessary, to dispose of waste materials. All waste shall be appropriately packaged for off-site transportation, if applicable.
 - 4.10.3 Wastes shall be marked, labeled, and shipped in accordance with regulatory requirements. For additional information, see *S3AM-116-PR1 Hazardous Materials Shipping*.
- 4.11 Inspect corrosive and reactive storage and use areas periodically.
- 4.11.1 Inspect office, laboratory, and project settings quarterly.
 - 4.11.2 Use the inspection sheet provided as *S3AM-125-FM1 Corrosive & Reactive Materials Inspection* or equivalent, to inspect sites.

5.0 Records

The following information will be maintained in the location or project file:

- 5.1 Completed Corrosive and Reactive Material Inspection Sheets.
- 5.2 Worker Right-to-Know training documentation.
- 5.3 Written Spill Response Plan.
- 5.4 Waste Management Plan.
- 5.5 Documentation of training for spill response personnel.
- 5.6 Documentation of hazard communication training for personnel exposed to corrosive and/or reactive materials.

6.0 Attachments

- 6.1 [S3AM-125-FM1 Corrosive & Reactive Materials Inspection](#)

Americas

Corrosive & Reactive Materials Inspection

S3NA-125-FM1

Location: _____

Name of Inspector: _____

Date Inspected: _____

Labeling

1. Original containers are labeled with: ☐ Yes ☐ No ☐ NA
- Name of chemical
 - Signal word (e.g., DANGER; WARNING; CAUTION, etc.)
 - Manufacturer

Pre-Job Activities

2. Corrosives and reactives are stored in a cool, dry environment, free from temperature extremes ☐ Yes ☐ No ☐ NA
3. Corrosives and reactives are stored in their properly labeled original containers, cushioned against shock, and stored to prevent leaks ☐ Yes ☐ No ☐ NA
4. Corrosives are not stored in the vicinity of oxidizers ☐ Yes ☐ No ☐ NA
5. Hydrofluoric acid is stored only in acid-proof polyethylene- or ceresin-lined containers ☐ Yes ☐ No ☐ NA
6. Corrosives are stored on acid-resistant material ☐ Yes ☐ No ☐ NA
7. Chromic acid, nitric acid, perchloric acid, and potassium permanganate (all oxidizers) are stored separately from other corrosives and flammables ☐ Yes ☐ No ☐ NA

Handling

8. The following minimum required PPE is used when working with corrosives: ☐ Yes ☐ No ☐ NA
- Chemical splash goggles
 - Chemical resistant gloves
 - Chemical resistant apron
9. Bottles or carboys are opened slowly to guard from splashes. ☐ Yes ☐ No ☐ NA
10. The outside of the container is washed off with water after use to clean off any droplets of material. ☐ Yes ☐ No ☐ NA
11. An eyewash is located in all areas where corrosives are used. ☐ Yes ☐ No ☐ NA
12. An eyewash is: ☐ Yes ☐ No ☐ NA
- Within 25 feet (7.62 meters) or 10 seconds of travel ☐ Yes ☐ No ☐ NA
 - Marked with a highly visible sign ☐ Yes ☐ No ☐ NA
 - Well lit and visible ☐ Yes ☐ No ☐ NA
 - Working and delivering a minimum of 1.5 liters of water per minute for 15 minutes ☐ Yes ☐ No ☐ NA
13. Where substantial quantities of corrosives and/or reactives are stored, access to an emergency shower is available. ☐ Yes ☐ No ☐ NA
14. Spill control materials compatible with chemicals are available for emergency use. ☐ Yes ☐ No ☐ NA

Waste Disposal

15. Organic acid, inorganic acid, and basic waste are kept segregated. ☐ Yes ☐ No ☐ NA
16. Corrosive waste is disposed in accordance with regulatory and client requirements. ☐ Yes ☐ No ☐ NA
17. A waste management plan or procedure is in place. ☐ Yes ☐ No ☐ NA
18. Arrangements for waste collection, transport, and disposal are in place. ☐ Yes ☐ No ☐ NA

Comments: _____

Hand & Power Tools

S3AM-305-PR1

1.0 Purpose and Scope

- 1.1 This procedure provides the AECOM requirements for all manually operated hand and power tools and associated use, handling and storage. These requirements apply to tools provided by AECOM for employee use as well as tools provided by employees for use on AECOM work sites.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

- 2.1 None

3.0 References

- 3.1 S3AM-003-PR1 SH&E Training
- 3.2 S3AM-118-PR1 Hearing Conservation
- 3.3 S3AM-208-PR1 Personal Protective Equipment
- 3.4 S3AM-302-PR1 Electrical Safety
- 3.5 S3AM-325-PR1 Lockout Tagout

4.0 Procedure

- 4.1 Roles and Responsibilities
 - 4.1.1 **Managers/Supervisors**
 - Ensure that all aspects of this procedure are followed and adhered to on all AECOM projects, sites and locations.
 - If a specific tool is not included in the work instructions related to this procedure, appropriate guidelines shall be established prior to work associated with that tool, including following manufacturer's recommendations.
 - Ensure compliance with applicable client requirements and restrictions regarding hand or power tools.
 - 4.1.2 **Safety, Health and Environment (SH&E) Manager**
 - Provide technical guidance and support as to this procedure and associated work instructions.
 - 4.1.3 **Employees**
 - Work only with tools for which they are appropriately trained and familiar with.
 - Follow manufacturer's recommendations for its use and never modify the equipment without first obtaining authorization from the manufacturer.
 - Comply with applicable client requirements and restrictions regarding hand or power tools.
- 4.2 Requirements
 - 4.2.1 Always conduct a task hazard assessment (THA) prior to work commencing and include the identified hazards associated with the anticipated tool use.

- 4.2.2 No employee shall use any hand or power tool, unless they are familiar with the use and operation of the equipment or have received specific instruction on its use and operation.
- 4.2.3 All tools will be used for which they were designed and in accordance with manufacturer's specifications. Do not use tools for jobs they are not intended for. For example, do not use a slot screw driver as a chisel, pry bar, wedge or punch or wrenches as hammers.
- 4.2.4 Use approved tools only. Never modify or use makeshift tools.
- 4.2.5 Do not apply excessive force or pressure on tools unless permitted by the manufacturer's specifications. This includes additional force by hammering with body weight, foot or other tools.
- 4.2.6 Keep surfaces and handles clean and free of excess oil and grease to prevent slipping.
- 4.2.7 Do not carry sharp tools (e.g. knife, chisel, screwdriver, etc.) in pockets; this practice may cause puncture wounds.
- 4.2.8 All tools shall be properly maintained. Clean, dry, lubricate and repair tools as applicable, and return to a suitable toolbox, room, rack, or other storage area upon completion of a job.
- 4.2.9 Ensure proper ergonomics principles are observed when using hand and power tools, such as but not limited to:
 - Avoid static and awkward positions when possible.
 - o Move at intervals to reduce muscle fatigue.
 - o Consider tools with a trigger strip, rather than a trigger button. This strip will allow the exertion of more force over a greater area of the hand that, in turn, will reduce muscle fatigue
 - Do not apply excessive force or pressure on tools.
 - If possible use tools with comfortable grips that are designed to allow the wrist to stay straight. Avoid using a bent wrist.
 - Choose hand tools that have a centre of gravity within or close to the handle.
 - Frequently used tools that weigh more than 1 pound (0.45 kilograms) should be counter-balanced.
 - Ensure proper body positioning when using a tool to prevent slips or falls in the event of unanticipated tool behaviour (slip, kickback, etc.). Avoid over-reaching.
 - Pull on tools such as a wrench or pliers whenever possible. Loss of balance is more likely when pushing if the tool slips. If pushing is necessary, hold the tool with an open palm.
 - Hand-arm vibration exposure is associated with the use of hand tools.
 - o Reduce power to the lowest setting that can complete the job safely. This action reduces tool vibration at the source.
 - o Consider the need for controls such as limiting time of use.
 - o If safe to do so, adjust to a looser but stable grip, and use anti-vibration gloves.
 - Use of heavy tools such as jackhammers can cause fatigue and strains. Heavy rubber grips can reduce these effects by providing a secure handhold.
 - Do not increase a tool's leverage by adding sleeved additions (e.g. a pipe or snipe) to increase tool handle length.
- 4.2.10 Avoid placing fingers and hands in danger zones:
 - Ensure hands and fingers have sufficient clearance in the event the tool slips.
 - Ensure stability of the work-piece. Use work-piece holders (e.g. vise, chisel holder, etc.) whenever possible to prevent injury to hands or deflection of tool or work-piece.

- Use push sticks or guides when cutting or machining smaller material.
- 4.2.11 Secure tools when working from heights to prevent them from falling. Never leave tools on ladders, scaffolds, or overhead work areas when they are not in use.
- 4.2.12 Utilize good housekeeping practices to ensure tools do not present a tripping hazard.
- 4.2.13 Ensure no part of a tool extends over the edge of the bench top. Place sharp tools (e.g., saws, chisels, knives) on benches so that sharp points or edges face away from the edge.
- 4.2.14 When using saw blades, knives, or other tools, if possible direct the tools away from aisle areas and away from other employees working in close proximity.
- 4.2.15 Do not throw tools from place to place or from person to person, or drop tools from heights. Hand them, handle first, directly to other workers.
- 4.2.16 Use non-sparking and intrinsically safe tools in atmospheres with flammable or explosive characteristics and where highly volatile liquids, and other explosive substances are stored or used.
 - Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials shall be used.
 - Electrical tools shall be identified as intrinsically safe.
- 4.2.17 If the task presents electrical hazards, worker must be competent and use the appropriate insulated tools to perform work that includes the risk of electrical shock. Cushioned grip handles do not protect against electrical shock.
- 4.2.18 The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.
- 4.2.19 All tools designed to accommodate guards must have the guard(s) in place when the tool is in use. Do not modify, remove, or disable any machine guards.
- 4.2.20 Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.
- 4.2.21 Make provisions to prevent tools from automatically restarting upon restoration of power. Refer to *S3AM-325-PR Lockout Tagout*.
- 4.3 Training
 - 4.3.1 Instruction in the proper use, safe handling, and maintenance of tools will be provided to employees unfamiliar with the tool.
 - Assess the employee's training needs as per *S3AM-003-PR1 SH&E Training* procedure.
 - Refer to the applicable work instructions associated with this procedure for any additional training specifics.
 - Training shall include applicable manufacturer's recommendations and guidelines.
 - 4.3.2 Employees shall demonstrate knowledge and competency in the use, safe handling and maintenance of the applicable tool prior to operation.
- 4.4 Personal Protective Equipment (PPE)
 - 4.4.1 Utilize basic PPE appropriate to the task; gloves, safety-toed boots, hard hats and safety glasses with side shields. Refer to *S3AM-208-PR1 Personal Protective Equipment*.
 - 4.4.2 Ensure lockout devices (padlocks, multiple lock hasps, tags) are utilized as necessary. Refer to *S3AM-325-PR Lockout Tagout*.

- 4.4.3 Ensure PPE is appropriate to the work and use additional PPE as required (e.g. mono-goggles, hearing protection, respiratory protection, etc.).
- Dual eye protection is required to be worn by any employee undertaking or within 3 ½ feet (1 meter) of a task that produces projected particles or material.
 - Head and face protection is recommended for employees working with pneumatic tools.
 - Noise hazard is associated with pneumatic and many other tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.
- 4.4.4 Screens shall also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.
- 4.4.5 Refer to the applicable work instructions associated with this procedure for any additional specialized PPE.
- 4.5 Inspections
- 4.5.1 All tools must be inspected prior to each use.
- Any tool that is defective or has missing parts must not be used.
 - Every broken or defective tool must be tagged 'out of service' or 'do not use' and immediately removed from service.
 - Tagged tools will be returned to the supervisor for repair or replacement.
- 4.5.2 All tools must be inspected to manufacture's specifications and according to tool rests and guard adjustment tolerances. All tools will be inspected to ascertain that all safety devices are present and functioning properly. Refer to *S3AM-305-FM1 Hand & Power Tool Maintenance Inventory* and *S3AM-305-FM2 Hand & Power Tool Inspection Report*.

5.0 Records

- 5.1 None

6.0 Attachments

- 6.1 [S3AM-305-ATT1 Chainsaw](#)
- 6.2 [S3AM-305-ATT2 Circular Saw](#)
- 6.3 [S3AM-305-ATT3 Cut Off Saw](#)
- 6.4 [S3AM-305-ATT4 Handheld Grinder](#)
- 6.5 [S3AM-305-ATT5 Impact Wrench](#)
- 6.6 [S3AM-305-ATT6 Nail Gun](#)
- 6.7 [S3AM-305-ATT7 Dustless Vacuum](#)
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- 6.13 [S3AM-305-ATT13 Clearing & Grubbing Equipment](#)
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- 6.16 [S3AM-305-ATT16 Small Engines](#)
- 6.17 [S3AM-305-ATT17 Electric & Battery Hand Tools](#)
- 6.18 [S3AM-305-FM1 Hand & Power Tool Maintenance Inventory](#)
- 6.19 [S3AM-305-FM2 Hand & Power Tool Inspection Report](#)

Chainsaw

S3AM-305-ATT1

1.0 Objective / Overview

- 1.1 Available in a variety of types and capacities, chainsaws are one of the most powerful, yet dangerous cutting tools available.
- 1.2 Working safely with a chain saw includes proper training, good body mechanics and felling technique, well-maintained equipment, and protective clothing.

2.0 Hazards

- 2.1 Improper operation (kickback – sudden and violent reverse movement of the saw)
- 2.2 Hand/arm vibration
- 2.3 Noise
- 2.4 Flying/falling debris
- 2.5 Sharp, moving blade
- 2.6 Defective tool

3.0 Safe Operating Guidelines

- 3.1 Only approved operators are permitted to operate a chainsaw.
- 3.2 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT16 Small Engines* for additional guidelines.
- 3.3 Inspect saws prior to use and periodically during use:
 - 3.3.1 A sharp chainsaw is safer than a dull one. Worn chains shall be replaced immediately.
 - 3.3.2 Keep the saw clean, lubricated, and adjusted.
 - 3.3.3 Inspect and test the chain brake, chain catch, throttle lock, handles and guards, all nuts and bolts, spark arrestor, and muffler and air filter.
 - 3.3.4 The chain tension should be properly adjusted and the carburetor tuned. The idle must be correctly adjusted; the chain should not move when the saw is in the idle mode.
 - 3.3.5 Ensure the saw is fitted with an inertia break and hand guard.
 - 3.3.6 Ensure the saw is fueled with the appropriate fuel type.
 - 3.3.7 Do not operate a chain saw that is damaged or improperly adjusted, or is not completely and securely assembled. If a chainsaw is defective, remove it from service, and tag it clearly "Out of service for repair" or "Do Not Use". Replace damaged equipment immediately – do not use defective tools "temporarily." DO NOT ATTEMPT FIELD REPAIRS.
- 3.4 Never "drop start" the saw (the saw is held in the air with one hand on the handlebar and the other on the pull cord) as no control is provided to prevent rotation of the saw back toward the user.
- 3.5 Ensure an appropriately sized fire extinguisher or fire-fighting equipment is readily available.
- 3.6 A chainsaw is not only dangerous to the operator but also to surrounding persons. Do not allow others in the area when chainsaws are operated.
- 3.7 Never operate a chain saw when fatigued.

- 3.8 Make sure there are no nails, wire, or other imbedded material in the material to be cut that can cause flying particles or kickback.
- 3.9 Keep all parts of the body away from the saw chain when the engine is running.
 - 3.9.1 Keep the saw close to the body.
 - 3.9.2 Bend from the knees, not the waist. Improper lifting techniques and poor posture contribute to injuries.
 - 3.9.3 Always avoid standing on the log and making cuts with the saw between your legs; always cut with the saw to the outside of your legs.
 - 3.9.4 Always stand to one side of the limb to be cut, never straddle it.
 - 3.9.5 Never cut above chest height.
- 3.10 Determine where the tree/limb will fall prior to cutting.
 - 3.10.1 Start cutting only after a clear escape path has been made.
 - 3.10.2 Always ensure that personnel and equipment are not in the path of the falling tree/log, and that you have time to move away.
 - 3.10.3 If necessary, flag/or fence off the area to prevent entry.
- 3.11 Always keep in mind where the chain will go if it breaks; never position body or allow others in line with the chain.
- 3.12 Avoid operations that could result in kickback of the saw towards the operator.
- 3.13 Keep the chain out of the dirt, debris will fly, the teeth will be dulled and the chain life shortened.
- 3.14 Shut the saw off when carrying through brush or on slippery surfaces. The saw may be carried no more than 50 feet (15 meters) while idling.



Blade nose strikes another object



Improper starting of bore



Top or blade nose touches bottom or side of kerf during reinsertion

4.0 Personal Protective Equipment

- 4.1 Dual eye protection – safety glasses with side shields and a face shield
- 4.2 Chainsaw Chaps
- 4.3 Wear appropriate apparel. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.
- 4.4 Safety toe work boots
- 4.5 Hardhat with lateral impact protection
- 4.6 Gloves providing impact, abrasion, cut, tear, & puncture resistance
- 4.7 Hearing Protection

Circular Saw

S3AM-305-ATT2

1.0 Objective / Overview

- 1.1 The circular saw is used in cutting wood products (e.g. plywood, construction lumber, etc.).
- 1.2 Safe measures for use include proper training, good body mechanics and operating technique, well-maintained equipment, and protective equipment.

2.0 Hazards

- 2.1 Kickback – Sudden and violent reverse movement of the saw
- 2.2 Noise
- 2.3 Flying debris
- 2.4 Sharp, moving blade (severe cuts)
- 2.5 Defective tool
- 2.6 Improper operation



3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.
- 3.2 Use sharp blades and ensure cracked and dull blades are removed from service. Dull blades cause binding, stalling and possible kickback.
- 3.3 Use the correct blade for the application and check for proper operation before each cut.
- 3.4 Check often to ensure that guards return to their normal position quickly. Never defeat the guard to expose the blade.
- 3.5 Portable circular saws having a blade greater than 2 inches (5.08 centimeters) in diameter must be equipped at all times with guards. An upper guard must cover the entire blade of the saw.
- 3.6 A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work position.
- 3.7 Before starting a circular saw, be sure the power cord and extension cords are out of the blade path and are long enough to freely complete the cut. A sudden jerk or pulling on the cord can cause loss of control of the saw and a serious accident.
- 3.8 Secure the work being cut to avoid movement.
- 3.9 For maximum control, hold the saw firmly with both hands after securing the work piece.
- 3.10 Keep the upper and retracting lower blade guard and the motor free from dust.
- 3.11 Do not hold or force the retracting lower guard in the open position.
- 3.12 Do not over tighten the blade-locking nut.
- 3.13 Do not twist the saw to change, cut or check alignment.
- 3.14 Do not use a saw that vibrates or appears unsafe in any way.
- 3.15 Do not force the saw during cutting.
- 3.16 Do not cut materials without first checking for obstructions or other objects such as nails and screws.
- 3.17 Check frequently to be sure clamps remain secure.

- 3.18 Avoid cutting small pieces that can't be properly secured and material on which the saw shoe can't properly rest. Use a push stick or guide when cutting operation requires the hands of the operator to come close to the blade.
- 3.19 Do not overreach. Keep proper footing and balance.
- 3.20 When starting the saw, allow the blade to reach full speed before contacting the work piece.
- 3.21 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.
- 3.22 Never place hand under or in front of the shoe or guard of the saw when operating.
- 3.23 Cut at the proper depth ($\frac{1}{4}$ inch / 0.64 centimeters) below work surface. Set the depth of the blade prior to use, when the saw is unplugged.

4.0 Personal Protective Equipment

- 4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewelry can become caught in moving parts.
- 4.2 Gloves that provide cut, abrasion and impact resistance.
- 4.3 Kickback apron as necessary.
- 4.4 Safety toed boots.
- 4.5 Safety glasses with side shields and faceshield.
- 4.6 Hearing Protection.

Cut Off Saw

S3AM-305-ATT3

1.0 Objective / Overview

- 1.1 Cut-off saws are high-speed cutting tools and very dangerous to operate. Therefore, it is very important to review the general safety rules, training, Personal Protective Equipment and procedures for working with portable cut off saws.
- 1.2 Cut off saws are used in a variety of activities (i.e. concrete, piping, metal, etc.).

2.0 Hazards

- 2.1 Noise
- 2.2 Flying debris
- 2.3 Sharp, moving blades (severe cuts)
- 2.4 Ignition sources (hot engine, sparks)
- 2.5 Hand/arm vibration
- 2.6 Kickback – Sudden and violent reverse movement of the saw

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* or *S3AM-305-ATT16 Small Engines* for additional guidelines
- 3.2 In addition to inspecting the general tool prior to operation, inspect the abrasive wheel for cracks and chips and appropriate wheel type.
 - 3.2.1 If cracked or chipped, replace wheel before use.
 - 3.2.2 Do not use abrasive-type wheels for rough grinding.
- 3.3 Ensure the saw is started in accordance with manufacturer's specifications:
 - 3.3.1 Start the saw on firm ground or other solid surface in an open area.
 - 3.3.2 Never "drop start" the saw as in the above picture (the saw is held in the air with one hand on the handlebar and the other on the pull cord) as no control is provided to prevent rotation of the saw back toward the user.
- 3.4 Handling
 - 3.4.1 Hold the saw firmly with two hands when the engine is running, and whenever the blade is rotating until it comes to a complete stop.
 - 3.4.2 Carry the saw with engine stopped, muffler away from your body, while protecting the cutting wheel from striking the ground or other objects.
- 3.5 Cutting
 - 3.5.1 Clear the working area.
 - 3.5.2 Begin cutting at full throttle and continue at full throttle until the cut is finished.
 - 3.5.3 Avoid standing in a direct line with the cutting wheel.
 - 3.5.4 Use only downward pressure on the saw, as lateral pressure may cause the blade to break and shatter.

- 3.5.5 Do not change the direction of the cut once started, as this can also cause the blade to break and shatter.
- 3.5.6 Do not cut above shoulder height.
- 3.5.7 Avoid operating the saw if the terrain is wet and/or frozen.
- 3.5.8 Keep flammable and combustible materials away from saw while cutting.
- 3.5.9 Ensure an appropriate fire extinguisher or fire-fighting equipment is readily available.
- 3.6 Maintenance
 - 3.6.1 Shut off the engine and remove the spark plug wire before adjusting or working on the saw.

4.0 Personal Protective Equipment

- 4.1 Safety glasses with side shields and faceshield.
- 4.2 Chainsaw chaps.
- 4.3 Safety toe work boots.
- 4.4 Gloves that provide cut abrasion and impact resistance.
- 4.5 Hearing protection: earplugs and/or earmuffs.
- 4.6 Respirator if required (concrete operations).

Handheld Grinder

S3AM-305-ATT4

1.0 Objective / Overview

- 1.1 Handheld grinders are high-speed electric- or pneumatic-powered grinding tools used to shape or cut metal, and can be dangerous to operate.
- 1.2 Grinders are used in a variety of activities (i.e., piping installation/repair, metal, restoring, polishing, sharpening, etc.).

2.0 Potential Hazards

- 2.1 Kickback – Sudden and violent reverse movement of the grinder
- 2.2 Electric shock
- 2.3 Flying debris
- 2.4 An improperly installed or incompatible wheel can break or explode and cause injury.
- 2.5 Moving parts (severe cuts)
- 2.6 Fire hazard from sparks igniting nearby debris or objects
- 2.7 Noise
- 2.8 Hand/arm vibration

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.
- 3.2 Inspect the tool before every use. Damaged tools must be removed from use and tagged "DO NOT USE".
- 3.3 Grinder guards are to be used at all times and must not be altered.
 - 3.3.1 US requirements specify a maximum of 180° of the grinding wheel to be exposed.
 - 3.3.2 While 120° coverage may be permissible in certain jurisdictions, guards that are greater are not to be cut down.
 - 3.3.3 Replace damaged or defective guards immediately
- 3.4 Grinders must be used with an unmodified manufacturer supplied handle at all times. If removal of the handle is required the reason must be appropriately documented and approved by project / location manager and SH&E manager or designee. Client approval may also be required.
- 3.5 Trigger locks are not permitted. If a grinder is found with a trigger lock, the lock shall be disabled.
- 3.6 Never use the grinder for jobs for which it is not designed (e.g. cutting with a grinding wheel vs. cutting disc).
- 3.7 Grinders must be permanently marked with the manufacturer's established maximum RPM (revolutions per minute).
- 3.8 Inspect the disk or wheel prior to operation:
 - 3.8.1 Wire wheels must be inspected for loose and broken wires.



- 3.8.2 Ensure the RPM (as posted on the wheel) is equal to or greater than that posted on the grinder, the disk / wheel is the correct size for the grinder, and the type of wheel is compatible with the material being ground or cut.
- 3.8.3 Wheels must be replaced as specified by the manufacturer. In the absence of specifications a wheel shall not be worn down to a size which would allow the mounting flange assembly to contact the work-piece or work-piece holding fixture.
- 3.8.4 Ensure the disk or wheel is checked for cracks or other damage. A ring test can be conducted on clean, dry, unmounted wheels greater than 4" (10.16 centimeters) in diameter:
 - Suspend the wheel by its arbor hole;
 - Use a non-metallic tool (wood, plastic) to gently tap the wheel at 45° from the vertical center line on either side of the wheel, approximately 1 to 2 inches (2.5 – 5 centimeters) from the edge;
 - Rotate the wheel 45° and repeat the process until the entire wheel has been tested;
 - A wheel that emits a metallic ring indicates absence of damage, whereas a dull sound means the wheel should be removed from service.
- 3.8.5 If cracked, chipped, or there is any other evidence of damage, remove from service and replace wheel before use.
- 3.9 When mounting the wheels:
 - 3.9.1 Grinders must be unplugged before changing wheels, discs or positioning guards.
 - 3.9.2 Follow manufacturer's specifications (e.g. stamp facing grinder, mount up, mount down, etc.)
 - 3.9.3 Ensure that the mounting flanges are clean and the mounting blotters are used.
 - 3.9.4 Do not over tighten the mounting nut.
 - 3.9.5 Before grinding or cutting, run newly mounted wheels at operating speed to check for vibrations.
- 3.10 General Safety Provisions
 - 3.10.1 Ensure abrasive wheels are stored according to manufacturer specifications (absence of temperature extremes and solvents, dry area protected from impact, first in first out).
 - 3.10.2 Keep the work area clean. Do not grind near flammable and combustible materials. Sparks can ignite debris and flammable vapors. A fully charged fire extinguisher must be located nearby. Use of a fire blanket may be necessary.
 - 3.10.3 All observers should be kept at a safe distance from the work area to ensure they are protected from flying debris / sparks. Whenever practicable, use screens or shields.
 - 3.10.4 Always secure work with clamps or a vise, freeing both hands to operate the tool. Never clamp a handheld grinder in a vice.
 - 3.10.5 Use grinding wheels only at their rated speed.
 - 3.10.6 Ensure safety guard(s) is positioned properly prior to start-up.
 - 3.10.7 Allow the grinder to come to full operating speed before beginning grinding operation.
 - 3.10.8 Do not use the side of a grinding wheel unless the wheel is designed for side grinding.
 - 3.10.9 Always stand to the side of the wheel, never directly behind it.
 - Be sure to keep your footing and maintain proper balance. Keep hands, fingers, and other body parts from coming into contact with the revolving wheel.
 - While in operation, grinder shall be held with a firm grip using both hands. One engaging the trigger, and the second holding the handle.

3.10.10 Grinding aluminum is prohibited.

3.10.11 Tools shall be maintained with care. They should be kept clean and sharp for the best performance. Follow instructions in the user's manual for lubricating and care instructions.

4.0 Personal Protective Equipment (PPE)

4.1 Please refer to *S3AM-208-PR1 Personal Protective Equipment* for further information.

4.2 Gloves providing appropriate heat, impact, abrasion, cut, tear, & puncture resistance.

4.3 Wear appropriate apparel. Long-sleeved shirts and pants are required; clothing shall be made of natural fibers. Synthetics are not permitted. Note: Long hair, loose or baggy clothing, hoodie strings, ties, or jewelry can become caught in moving parts.

4.4 Dual eye protection required - Safety glasses with sideshields and properly impact-rated face shield. Welding helmets used as a face shield shall be verified as approved by CSA / ANSI for protection against impact.

4.5 Safety toe work boots.

4.6 Hearing protection: earplugs and/or earmuffs.

4.7 Other PPE as necessary for the work site/activity (e.g., hard hat, respiratory protection).

Impact Wrench

S3AM-305-ATT5

1.0 Objective / Overview

- 1.1 Impact wrenches are mainly used for tire changing but that does not limit their use. They can be used in all applications when a certain amount of torque is needed to loosen or tighten nuts and bolts.
- 1.2 The danger comes in to play when employees try to use the wrong sockets with an air wrench. Employees using air wrenches must have a general understanding of how to use them.

2.0 Potential Hazards

- 2.1 Flying debris
- 2.2 Noise
- 2.3 Cuts
- 2.4 Hand/arm vibration

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT14 Pneumatic Tools* for additional guidelines.
- 3.2 Impact wrench sockets and accessories must be used with this tool. Do not use hand sockets and accessories.
- 3.3 The proper fastening torque may differ depending upon the kind or size of the bolt.
- 3.4 Check the torque with a torque wrench.
- 3.5 Connect tool to air hose of recommended size.
- 3.6 Never use a wire, soft pin, or nail to hold the socket onto the square spindle of the impact wrench.
- 3.7 If the proper retaining device on the tool is broken, the tool shall be removed from service to be repaired.
- 3.8 On applications where a low or critical level of torque is required, it is recommended that each fastener is impacted lightly. Then perform the final tightening with a hand torque wrench.

4.0 Personal Protective Equipment

- 4.1 Safety toed boots
- 4.2 Anti-vibration gloves with impact and abrasion and cut resistance.
- 4.3 Safety glasses with side shields.
- 4.4 Hearing protection.

Nail Gun & Stapling Tool

S3AM-305-ATT6

1.0 Objective / Overview

- 1.1 Nail guns and stapling tools (pneumatic power-fastening devices) are useful, but must be handled with care.
- 1.2 Nail guns and stapling tools have been shown to be the cause of unnecessary injuries when the design of the gun places emphasis on speed, rather than safety.

2.0 Potential Hazards

- 2.1 Flying debris/nails
- 2.2 Imbedded object
- 2.3 Puncture wounds
- 2.4 Noise

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT14 Pneumatic Tool* for additional guidelines.
- 3.2 Permit only experienced and trained persons to operate pneumatic nailing and stapling tools. Never let an inexperienced worker use a nail gun without supervised training.
- 3.3 Never point a nail gun or stapling tool toward the body or any other personnel.
 - 3.3.1 Never rest the gun against any part of your body, or try to climb a ladder with the gun cradled against your body.
 - 3.3.2 Be aware of other workers in the work area.
 - 3.3.3 Be aware of what is located behind the nailing surface. Never place hands or other body parts directly behind the nailing surface.
 - 3.3.4 Ensure no one is in the line of fire should an incorrectly selected fastener eject out the other side of the material.
- 3.4 Inspect a tool before connecting it to air supply:
 - 3.4.1 Check tool safety mechanisms if applicable. Never disable a safety tip on a nail gun or stapling tool.
 - 3.4.2 Tighten securely all screws and cylinder caps.
 - 3.4.3 Pneumatic power-fastening devices that shoot nails, rivets, staples, or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a safety interlock to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.
- 3.5 Check correct air supply and pressure before connecting a tool.
- 3.6 Check that the tool is correctly and securely connected to the air supply hose and that it is in good working order, with the safety mechanism operative, before using.
- 3.7 Always handle a tool as if it loaded with fasteners (nails, staples, etc.). Do not carry a tool with a finger on the trigger or with the trigger depressed.
- 3.8 Equip tools with a work-contacting element that limits the contact area to one that is as small as practical.
- 3.9 Make sure that the mechanical linkage between the work-contacting element and trigger is enclosed.

- 3.10 Disconnect a tool from the air supply and ensure the air is completely exhausted from the tool when the tool is unattended, when loading with fasteners (nails, staples), and during cleaning or adjustment.
- 3.11 Before clearing a blockage, be sure that depressing the trigger exhausts all air from the tool and the tool is disconnected from the air supply.
- 3.12 Use only fasteners recommended by the manufacturer. Ensure fasteners are appropriate to the work surface to ensure fastener does not eject completely through the material.
- 3.13 Avoid nailing into knots as nail can splinter wood.
- 3.14 Permit only properly trained people to carry out tool maintenance.
- 3.15 Do not depress the trigger unless the nosepiece of tool is directed onto a safe work surface and properly aligned both vertically and horizontally with the surface
- 3.16 Do not overreach. Keep proper footing and balance.
- 3.17 Ensure the hand not holding the nail gun or stapling tool is a minimum of 12 inches (30cm) away from the nosepiece of the tool.
- 3.18 Keep the gun properly aligned with your work both vertically and horizontally.

4.0 Personal Protective Equipment

- 4.1 Gloves providing appropriate protection to the task (e.g. impact, puncture, chemical, etc.).
- 4.2 Safety toed boots.
- 4.3 Use hearing protection, where required.
- 4.4 Wear safety glasses with side shields at all times and face shield if flying debris may be encountered.

Dustless Vacuum

S3AM-305-ATT7

1.0 Objective / Overview

- 1.1 Dustless decontamination system (also referred to as Pentek brand name) removes and packages surface contamination from concrete and steel structures.
- 1.2 The Pentek integrated suite of manually operated equipment (e.g., squirrel III, corner cutter, roto-peen, and crack chaser) is designed for the safe removal of radioactive materials, lead-based paints, polychlorinated biphenyls, pesticides, chemical residues, and other contaminated coatings.
- 1.3 The Pentek system incorporates a high-performance vacuum and waste packaging unit, the VAC-PAC, in conjunction with pneumatically operated equipment to remove contaminated material. Dust and debris are captured at the cutting tool surface. Supporting equipment required to operate the unit includes a 60 kilowatt generator and an air compressor (minimum 350 cubic feet capacity), as well as a drum grapple for drum handling activities.

2.0 Hazards

- 2.1 Noise
- 2.2 Vibration
- 2.3 Tripping
- 2.4 Hot surfaces (vacuum unit)
- 2.5 Electrical (high voltage)
- 2.6 Pinch
- 2.7 Back strain
- 2.8 High pressure air

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT14 Pneumatic Tool* for additional guidelines.
- 3.2 Prior to use, a pre-operation inspection must be completed to determine if the unit is in safe working condition.
- 3.3 The vacuum unit should be placed a minimum of 50 feet (15.2 meters) away from the work area.
- 3.4 Once in position to begin work, apply the brake to stabilize the unit. When raising the VAC-PAC to insert/remove a drum, do not place your body or any extremity under the VAC-PAC while it is in the raised position.
- 3.5 Two workers should be used to maneuver the unit into place.
- 3.6 A minimum 10 feet (3 meters) clearance will be established around the unit while in operation.
- 3.7 Workers should be aware of their position in relation to the hoses and cable to minimize tripping hazards.
- 3.8 A competent person will train each worker in the operation of the unit.
- 3.9 Maintenance in excess of preventive maintenance activities (e.g., lubrication) will be performed by manufacturer personnel ONLY. Always know where the emergency stop is located.
- 3.10 Operators of a motorized drum grapple must be trained in agreement with the powered industrial truck

standard. Refer to *S3AM-324-PR1 Powered Industrial Trucks*.

- 3.11 Review *S3AM-302-PR1 Electrical Safety* prior to refueling the electrical generator and/or compressor.

4.0 Personal Protective Equipment

- 4.1 Leather gloves (maintenance).
- 4.2 As applicable, Tyvek suit (with hood).
- 4.3 Anti-vibration gloves (operation).
- 4.4 Hearing protection (plugs or muffs).

Power Drill

S3AM-305-ATT8

1.0 Objective / Overview

- 1.1 Available in a variety of types and capacities, portable power drills are undoubtedly the most used power tools.
- 1.2 Because of their handiness and application to a wide range of jobs, drills often receive heavy use. For this reason, you will need to carefully check your drill's capacity limitations and accessory recommendations.

2.0 Hazards

- 2.1 Electricity
- 2.2 Flying debris
- 2.3 Rotating and sharp parts
- 2.4 Burns (hot bits)
- 2.5 Manual handling (sprains/strains - wrist)

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.
- 3.2 Always keep drill bits sharp.
- 3.3 Disconnect the power supply before changing or adjusting bit or attachments,
- 3.4 Do not use high speed steel (HSS) bits without cooling or using lubrication.
- 3.5 Be sure the chuck is tightly secured to the spindle. This is especially important on reversible-type drills. Tighten the bit securely as described by the owner/operators manual.
- 3.6 The chuck key must be removed from the chuck before starting the drill. A flying key can be an injury-inflicting missile.
- 3.7 Secure workpiece being drilled to prevent movement.
- 3.8 If the bit is long enough to pass through the material, select a shorter drill bit or provide against damage and injury.
 - 3.8.1 Prevent other workers from accessing the area.
 - 3.8.2 Remove or provide coverage for material that could be damaged by the drill bit.
- 3.9 Secure magnetic drills with a chain or rope to prevent falling. Label cord connections to prevent unplugging.
- 3.10 Check auxiliary handles, if part of the tool. Be sure they are securely installed.
- 3.11 Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur.
- 3.12 Grasp the drill firmly by insulated surfaces.
- 3.13 Always hold or brace the tool securely. Brace against stationary objects for maximum control. If drilling in a clockwise -- forward -- direction, brace the drill to prevent a counter-clockwise reaction.
- 3.14 Do not overreach. Always keep proper footing and balance.
- 3.15 Don't force a drill. Apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve

the pressure. Forcing the drill can cause the motor to overheat, damage the bit and reduce operator control.

4.0 Personal Protective Equipment

- 4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.
- 4.2 Gloves that provide cut, abrasion and impact resistance.
- 4.3 Safety toed boots.
- 4.4 Safety glasses with side shields and face shield.
- 4.5 Hearing protection.

Pressure Washer

S3AM-305-ATT9

1.0 Objective / Overview

- 1.1 Pressure washing can be divided into three categories based on the water pressure the equipment is capable of producing:
- Ultra high pressure jetting – greater than 30,000 psi
 - High pressure washing – 5,000 to 30,000 psi
 - Pressure washing – less than 5,000 psi
- 1.2 Generally, light duty portable pressure washing equipment and car washes produce less than 5,000 psi. High pressure washing equipment is often used for such tasks as cleaning vessels and process piping. Ultra high pressure jetting is also often employed to clean vessels and to remove coatings and scaling of production equipment. If not used correctly and safely, pressure washers can be dangerous piece of work equipment.
- 1.3 AECOM only allows trained, authorized personnel to operate the high pressure washers. Along with training, other safety measures include: reviewing the manufacturers instructional booklet, proper maintenance of equipment, and personal protective equipment.

2.0 Hazards

- 2.1 Kickback – Sudden and violent reverse movement of the gun
- 2.2 Flying debris
- 2.3 Slips and trips on wet surfaces and hoses
- 2.4 Noise
- 2.5 Manual handling
- 2.6 Exhaust fumes/carbon monoxide (CO) in enclosed spaces
- 2.7 Contact with high pressure / high temperature fluids

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, *S3AM-305-ATT17 Electric & Battery Hand Tools* or *S3AM-305-ATT16 Small Engines* for additional guidelines.
- 3.2 Ensure area is properly flagged with tags identifying work being performed and hazards. Keep all unauthorized workers out of area while job in progress.
- 3.3 Inspect all hoses, fittings, wands, cords and hose reel for damage or defects.
- 3.3.1 Equipment is complete and assembled correctly (i.e. nozzle tip correctly connected to the wand and not directly to hose).
- 3.3.2 Ensure trigger mechanism is functioning properly.
- 3.3.3 Fittings are securely attached.
- 3.3.4 Insulated components are in place.
- 3.4 Check fuel connections and hoses for signs of leaks, defects or damage.
- 3.5 Confirm nozzle / jets are clear by turning on water, without pump pressure.

- 3.6 Check pressure pump oil level before use. Hold the wand firmly with the trigger released when turning the pump on.
- 3.7 Recheck hoses once the system is pressurized.
- 3.8 Never service equipment while energized or pressurized.
- 3.9 Ensure other personnel are clear of area while pressure washer is pressurized. Non-operators must remain a minimum of 25 feet (7.6m) from the operator.
- 3.10 Do not wash at a 90 degree angle to minimize spray and flying debris.
- 3.11 Never point a pressure washer at yourself or others. Contact with high pressure fluid can result in serious cut or injection injuries.
- 3.12 Increase pressure slowly during operation to prevent hose kick-back.
- 3.13 Do not drive over, pull on, or kink the high pressure hose. Damage to the hose may compromise the wire braiding inside and cause the hose to burst.
- 3.14 Whip checks must be used for all high pressure connections.
- 3.15 High-pressure washing equipment should be cleaned often to avoid dirt buildup, especially around the trigger and guard area.
- 3.16 Always set the trigger safety lock when the gun valve is not in use.
- 3.17 Relieve the pressure in the system before coupling and uncoupling hoses.
- 3.18 Visually inspect the full length of high pressure discharge hose and inspect other high pressure fluid-handling components for abrasions or cuts, damage caused by exposure to chemicals and for damage caused by kinks in the hose.
- 3.19 High pressure washers shall be used to clean or decontaminate equipment, surfaces or structures only.
- 3.20 High pressure washers WILL NOT be used to clean or decontaminate workers or personal protective equipment while it is being worn.
- 3.21 Maintain a distance from the spray contact point to reduce noise exposure and risk of being struck by flying debris. Avoid overreaching and maintain a stable stance.
- 3.22 When shutting down a pressure washer, turn the pump off before turning the water supply off.
- 3.23 After turning off pressure washer, ensure all residual pressure is released from system by squeezing the trigger. Consult the operator's manual for any other procedures specific to the equipment for shut-down.
- 3.24 Protect unit from freezing, when applicable.

4.0 Personal Protective Equipment

- 4.1 Hardhat.
- 4.2 Safety glasses with side shields and a face shield.
- 4.3 Gloves providing appropriate protection (rubber, chemical).
- 4.4 Hearing protection.
- 4.5 PVC (or equivalent) rain suit.
- 4.6 Safety toed boots with metatarsal protection.

Reciprocating Saw

S3AM-305-ATT10

1.0 Objective / Overview

- 1.1 The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials have made it a widely used tool.
- 1.2 By design, it is a simple tool to handle. Its demands for safe use, however, are very important.

2.0 Potential Hazards

- 2.1 Flying debris
- 2.2 Noise
- 2.3 Sharp, moving parts (cuts)
- 2.4 Hand/arm vibration
- 2.5 Electricity

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.
- 3.2 Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.
- 3.3 Ensure appropriate blade selection. Different work surfaces demand different blades
- 3.4 Position yourself to maintain full control of the tool, and avoid cutting above shoulder height. Always use two hands to operate the saw.
- 3.5 To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job.
- 3.6 The work piece must be clamped securely, and the shoe of the saw held firmly against the work to prevent operator injury and blade breakage.
- 3.7 Maintain firm contact between the saw's shoe and the material being cut.
- 3.8 When making a "blind" cut (cannot see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut.
- 3.9 If wires are present, they must be disconnected at their power source by a qualified person or avoided, to prevent the possibility of lethal shock or fire.
- 3.10 Water pipes must be drained and capped.
- 3.11 Always hold the tool by the insulated grouping surfaces. When making anything other than a through cut, allow the tool to come to a complete stop before removing the blade from the work piece. This prevents breakage of the blade, and possible loss of tool control. Do not operate reciprocating saw in explosive atmospheres.
- 3.12 Do not overreach. Keep proper footing and balance at all times.
- 3.13 Check for misalignment or binding of moving parts, breakage or parts and any other condition that may affect the tool's operation.

4.0 Personal Protective Equipment

- 4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewelry can become caught in moving parts.
- 4.2 Gloves that provide cut abrasion and impact resistance.
- 4.3 Kickback apron, as necessary.
- 4.4 Safety toed boots.
- 4.5 Safety glasses with side shields and face shield.
- 4.6 Hearing protection.

Sander

S3AM-305-ATT11

1.0 Objective / Overview

- 1.1 Sanders are commonly used at project sites for a variety of tasks.
- 1.2 Often times the hazards associated with sanders are overlooked; they don't appear threatening because they don't have sharp blades or bits. These misconceptions can be prevented through proper training and personal protective equipment (PPE) selection.

2.0 Potential Hazards

- 2.1 Kickback – Sudden and violent reverse of the sander
- 2.2 Noise
- 2.3 Hand/arm vibration
- 2.4 Dust exposure
- 2.5 Flying debris
- 2.6 Severe abrasive parts
- 2.7 Electricity
- 2.8 Fuel (fine dust) and ignition sources (electricity, friction)

3.0 Safe Operating Guidelines

- 3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.
- 3.2 Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.
- 3.3 Inspect sanding belts before use. Replace those belts that are worn or frayed.
- 3.4 Install sanding belts that are the same widths as the pulley drum.
- 3.5 Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.
- 3.6 Secure the sanding belt in the direction shown on the belt and the machine. Keep hands away from the sanding belt.
- 3.7 Before starting a sander, be sure the power cord and extension cords are out of the belt path and are long enough to freely complete the task. The sander must be either double insulated or connected to a ground fault circuit interrupter.
- 3.8 Use two hands to operate sanders – one on the trigger and the other on the front handle knob. Move sanders away from the body.
- 3.9 Clean dust from the motor and vents at regular intervals.
- 3.10 Do not use a sander without an exhaust system or dust collector present that is in good working order. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential as well as guarding against open flame and sparks.
- 3.11 Empty the collector when ¼ full. Minimise dust disturbance when emptying the collector.
- 3.12 Do not exert excessive pressure on a moving sander. The weight of the sander provides adequate pressure for the job.

- 3.13 Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stop into place or use a 'stop block' to prevent movement.
- 3.14 Do not overreach. Always keep proper footing and balance.
- 3.15 Do not cover air vents of the sander.
- 3.16 Check often to ensure that guards are in their normal position.

4.0 Personal Protective Equipment

- 4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.
- 4.2 Gloves that provide cut, abrasion and impact resistance.
- 4.3 Safety toed boots.
- 4.4 Safety goggles and faceshield.
- 4.5 Hearing protection.
- 4.6 Respiratory protection, as necessary.

Knives

S3AM-305-ATT12

1.0 Objective / Overview

- 1.1 Knives serve a variety of purposes at work sites, and can be a useful tool, when used safely and correctly.
- 1.2 Learning proper positioning and correct use of a knife will drastically reduce the potential of cut-related injuries.

2.0 Hazards

- 2.1 Improper body positioning
- 2.2 Improper knife selection
- 2.3 Defective knife
- 2.4 Improper knife operation (including storage)

3.0 Safe Operating Guidelines

- 3.1 Select the appropriate knife for the task. Consider using a rounded tip blade if the task allows.
- 3.2 Always be sure that knives are sharp and not dull. A dull blade will require more force to cut, increasing the likelihood of injury (e.g. hand slipping, knife breaking, etc.). Replace dull blades – A knife that tears rather than cuts, generally indicates the blade is dull.
- 3.3 Be sure the blade is seated in the frame of the knife correctly, closed, and fastened together properly.
- 3.4 Always direct the cut away from yourself and others
 - 3.4.1 Keep body parts away from the cut line, (e.g., fingers, leg, etc.)
 - 3.4.2 Ensure that the material being cut is stabilized and not against a body part (e.g. cutting rope against your leg).
 - 3.4.3 Always pull the knife, never push the knife (the blade may break, and momentum could cause the body to come into contact with broken blade).
- 3.5 Ensure knife blades are protected or retracted when not in use.
 - 3.5.1 Never carry a knife with an exposed blade in your pocket.
- 3.6 Use of razor and break away utility knives is prohibited.
 - 3.6.1 Purchase safety-equipped utility knives with guarding or automatically retracting blades.
- 3.7 When using a knife to cut thicker materials, use several passes. Increased force on the blade can cause it to stray from the intended cut path, or break the blade.
- 3.8 When changing blades, always handle from the non-sharp side. Cover blade with duct tape and dispose.
- 3.9 Use an alternate tool when possible (scissors, wire cutters, etc.).
- 3.10 Let a falling knife fall.

4.0 Personal Protective Equipment

- 4.1 Cut resistant gloves are mandatory when using knives (Kevlar, thick leather, etc.).

Americas

Clearing & Grubbing Equipment

S3AM-305-ATT13

The following safety precautions will be followed during site clearing and tree falling.

1.0 General

- 1.1 Refer to *S3AM-305-PR1 Hand & Power Tools* for additional guidance.
- 1.2 As applicable, refer also to *S3AM-305-ATT15 Manual Hand Tools*, *S3AM-305-ATT16 Small Engines*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidance.
- 1.3 All clearing activities shall terminate during electrical storms and periods of high winds.
- 1.4 Dead, broken or rotted limbs or trees (widow makers) shall be felled first.
- 1.5 Be aware of the presence of other personnel when using any tool, especially picks or axes.

2.0 Machete, Pick and Axe Use

- 2.1 A machetes, picks and axes will only be used for their designated purpose; do not carelessly swing the tool when it is not needed.
- 2.2 To prevent lacerations, employees will wear Kevlar gloves and Kevlar chain saw chaps.
- 2.3 Machetes, picks and axes shall not be used when other employees are in the immediate work area.

3.0 Use of Weed Whips

- 3.1 Weed whips may be used to clear vegetation such as grass, light brush, briars and tree seedlings. The L-shaped weed whip cuts grass and weeds but is unstable for use on larger growth; the triangular-frame weed whip cuts briars and woody stems up to a half-inch in diameter. A "Suwannee" sling is a heavy duty weed whip that also has an axe blade. It does the same work as a weed whip, but can also cut through large materials. The heavier weight of this tool allows it to more easily cut off larger material than a weed whip.
- 3.2 When using weed whips, employees should follow these safety procedures:
 - 3.2.1 Select the correct tool for the types and size of vegetation present across the landfill.
 - 3.2.2 Employees will wear gloves that provide impact, abrasion, cut, tear, and puncture resistance when using weed whips.
 - 3.2.3 Weed whips are meant to be swung back and forth with both hands. Avoid using a golf swing. The tool should be swung no higher than an employee's side.
 - 3.2.4 Strong swings should be made to prevent the blade from bouncing or glancing off springy growth.
 - 3.2.5 Screws hold the serrated double-edge blade in place. These screws can work loose so check them before each use.
 - 3.2.6 At the end of the day, inspect the whips for damage. Clean, sharpen, and oil as necessary and store with a sheath in place.

4.0 Chain Saws

- 4.1 Refer to *S3AM-305-ATT1 Chainsaw*.

5.0 Felling Trees Manually

- 5.1 Before cutting begins, survey the work area for dead limbs, the lean of the tree to be cut, wind conditions and the location of other trees.

- 5.2 Remove lodged trees (tree has not fallen to the ground after being separated from its stump) as soon as possible. Never work under a lodged tree.
- 5.3 The distance between workers should be maintained at twice the height of the trees being felled.

6.0 Chipping Operations

- 6.1 Prior to use, make sure all safety devices and controls, such as emergency shut-off devices, are tested and verified to be functioning properly.
- 6.2 Access covers and doors shall not be opened until the drum or disk is at a complete stop.
- 6.3 Infeed and discharge ports shall be designed to prevent employee contact with disc, knives and blower blades.
- 6.4 The operator must be completely familiar with the controls and proper use of the equipment.
- 6.5 Workers feeding material into self-feeding wood chippers are at risk of being fed through the chipper if they reach or fall into the infeed hopper or become entangled in branches feeding into the machine.
 - 6.5.1 Make sure two workers (buddy system) are in close contact with each other when operating the chipper.
 - 6.5.2 Stand to the side of the chipper while inserting limbs into chipper, never stand directly in front.
 - 6.5.3 Insert trunk portion of tree/limb first. This will prevent the branches from getting entangled with clothing, etc. and pulling you in with the tree/limb.
 - 6.5.4 Bystanders should be kept at least 25 feet (7.6m) away when in operation.
 - 6.5.5 Keep the area around the wood chipper free of tripping hazards.
- 6.6 Never wear loose clothing that may get caught on feed material or moving parts.

7.0 Personal Protective Equipment

- 7.1 Wear proper apparel for the task.
 - 7.1.1 Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.
 - 7.1.2 Wear clothing with long sleeves and full length pants of durable material.
- 7.2 Use gloves that provide impact, abrasion, cut, tear and puncture resistance.
- 7.3 Safety toed boots with ankle support.
- 7.4 Safety glasses with side shields and face shield.
- 7.5 Hearing protection as necessary.

Pneumatic Tools

S3AM-305-ATT14

1.0 Objective / Overview

- 1.1 Pneumatic tools utilize air pressure to perform the tool's task.
- 1.2 Safe measures for use include proper training, good body mechanics and operating technique, well-maintained equipment, and protective equipment.
- 1.3 There are several dangers associated with the use of pneumatic tools. First and foremost is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

2.0 Hazards

- 2.1 Improperly secured air hoses
- 2.2 Noise
- 2.3 Flying debris
- 2.4 Defective tool
- 2.5 Improper operation

3.0 Safe Operating Guidelines

- 3.1 Review the manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.
- 3.2 Never use bottled gas as a power source for pneumatic tools.
- 3.3 Drain water from air compressor tank and condensation from air lines.
 - 3.3.1 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.
- 3.4 Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected. Pneumatic tools must have the air supply controlled according to manufacturer's specifications.
- 3.5 Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection between tool/hose/compressor to prevent whipping in case of disconnection or failure (e.g. chains, tie wires, whip checks or equivalent retaining devices).
- 3.6 Safety clips or tool retainers must be in place on pneumatic impact tools to prevent accessories (e.g. chisel on a chipping hammer) or attachments from being ejected.
- 3.7 If an air hose is more than 1/2-inch (12.7 mm) in diameter, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.
- 3.8 In general, the same precautions should be taken with an air hose that are recommended for electric cords, as the hose is subject to the same kind of damage or accidental striking, and because it also presents tripping hazards. Avoid creating trip hazards caused by hoses laid across walkways, curled underfoot, on ladders.
- 3.9 Airless spray guns that atomize paints and fluids at pressures of 1,000 pounds or more per square inch (6,890 kPa) must be equipped with automatic or visible manual safety devices that will prevent pulling the trigger until the safety device is manually released.

- 3.10 Ensure that the compressed air supplied to the tool is clean and dry. Dust, moisture, and corrosive fumes can damage a tool. An in-line regulator filter and lubricator increases tool life.
- 3.11 Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions.
- 3.12 Use only the attachments that the manufacturer recommends for the tools in use.
- 3.13 Use the proper hose and fittings of the correct diameter and type for the pneumatic or hydraulic application.
 - 3.13.1 The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.
 - 3.13.2 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.
 - 3.13.3 Choose air supply hoses that have a minimum working pressure rating of 150 pounds per square inch gauge or 150 percent of the maximum pressure produced in the system, whichever is higher.
 - 3.13.4 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.
- 3.14 Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.
- 3.15 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.
- 3.16 Do not operate the tool at a pressure above the manufacturer's rating.
- 3.17 Turn off the air pressure to the hose, exhaust the airline and disconnect the tool from the air supply when not in use, before servicing or when changing power tools or attachments.
- 3.18 Do not carry a pneumatic tool by its hose.
- 3.19 Do not use compressed air for cleaning purposes unless the pressure is reduced to 30 pounds per square inch (psi) or less. This rule does not apply for concrete form, mill scale, green cutting, and similar cleaning operations. Proper respiratory, hand, eye, and ear protection must be worn.
- 3.20 Compressed air guns shall never be pointed toward anyone.
 - 3.20.1 Employees shall never "dead-end" them against themselves or anyone else.
 - 3.20.2 A chip guard shall be used when compressed air is used for cleaning.
 - 3.20.3 Never use compressed air to blow debris or to clean dirt from clothes or body.

4.0 Personal Protective Equipment

- 4.1 Gloves providing appropriate protection to the task (e.g. impact, puncture, chemical, etc.)
- 4.2 Safety toed boots
- 4.3 Use hearing protection, where required.
- 4.4 Wear safety glasses with side shields at all times and face shield if flying debris may be encountered.

Manual Hand Tools

S3AM-305-ATT15

1.0 General

- 1.1 Review manufacturer's operating manual and *S3AM-305-PR1 Hand & Power Tools* for additional guidelines.
- 1.2 Carry tools using a heavy belt or apron and hang tools at your sides.
- 1.3 Never carry tools in your pockets or hanging behind your back.

2.0 Hammers

- 2.1 Hammers are designed according to the intended purpose. Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.
- 2.2 Choose a hammer with a striking face diameter approximately ½ inch (1.3 centimeters) larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).
- 2.3 Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. (Hammers with beveled faces are less likely to chip or spall).
- 2.4 Look behind and above you before swinging the hammer.
- 2.5 Watch the object you are hitting.
- 2.6 Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.
- 2.7 Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head. Remove from service and replace the handle if possible.
- 2.8 Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.
- 2.9 Do not use a hammer for any purpose for which it was not designed or intended.
- 2.10 Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.
- 2.11 Do not redress, grind, weld or reheat-treat a hammer head.
- 2.12 Do not strike with the side or cheek of the hammer.

3.0 Pipe Cutters, Reamers, Taps and Threaders

- 3.1 Replace pipe cutter wheels which are nicked or otherwise damaged.
- 3.2 Use a three- or four-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.
- 3.3 Choose a cutting wheel suitable for cutting the type of pipe material required:
 - 3.3.1 Thin wheel for cutting ordinary steel pipe.
 - 3.3.2 Stout wheel for cutting cast iron.
 - 3.3.3 Other wheels for cutting stainless steel, plastic and other materials.
- 3.4 Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75 percent as deep as the thread on the tap.
- 3.5 Use a proper tap wrench (with a "T" handle) for turning a tap.
- 3.6 Use lubricant or machine cutting fluid with metals other than cast iron.

- 3.7 Do not permit chips to clog flutes (grooves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning – this may result in the tap breaking if you continue to apply pressure.
- 3.8 Do not attempt to thread hardened steel. This can chip or damage the die.
- 3.9 Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.
- 3.10 Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

4.0 Pliers and Wire Cutters

- 4.1 Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.
- 4.2 Choose pliers or wire cutters that have a grip span of 2½ – 3½ inches (6.4 – 8.9 centimeters) to prevent palm or fingers from being pinched when the tools are closed.
- 4.3 Use adjustable pliers that allow for a firm grip of the work piece while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).
- 4.4 Use tools only if they are in good condition.
 - 4.4.1 Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.
 - 4.4.2 Make sure that the toothed jaws are clean and sharp. Greasy or worn-down jaws can result in compromised safety. Such tools also require increased force to hold the work piece which, in turn, increases the risk of muscular fatigue and repetitive strain injuries.
- 4.5 Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.
- 4.6 Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or injure your hand.
- 4.7 Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.
- 4.8 Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.
- 4.9 Do not expose pliers or wire cutters to excessive heat.
- 4.10 Do not bend stiff wire with light pliers. Needle-nose pliers can be damaged by using the tips to bend large wire. Use a sturdier tool.
- 4.11 Do not use pliers as a hammer.
- 4.12 Do not hammer on pliers or wire cutters to cut wires or bolts.
- 4.13 Do not extend the length of handles to gain greater leverage. Use a larger pair of pliers for gripping or a bolt cutter for cutting.
- 4.14 Do not use cushion grip handles for jobs requiring tools with electrically insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
- 4.15 Do not use pliers on nuts and bolts; use a wrench.

5.0 Screwdrivers

- 5.1 Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.
- 5.2 Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.

- 5.3 Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.
- 5.4 For cross-head screws, use the correct size and type of screwdriver; a Phillips screwdriver may slip out of a screw head designed for use with the slightly flatter-tipped Pozidriv screwdriver.
- 5.5 Use a vise or clamp to hold the stock if the piece is small or moves easily.
- 5.6 Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.
- 5.7 If work must be carried out on "live" electrical equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.
- 5.8 Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).
- 5.9 Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.
- 5.10 Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.
- 5.11 Use a screwdriver that incorporates the following features when continuous work is needed:
 - 5.11.1 Use a pistol grip to provide for a straighter wrist and better leverage.
 - 5.11.2 Use a "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.
 - 5.11.3 Use a ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.
- 5.12 File a rounded tip square making sure the edges are straight. A dull or rounded tip can slip out of the slot and cause hand injury or damage to materials.
- 5.13 Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.
- 5.14 Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.
- 5.15 Do not hold the stock in one hand while using the screwdriver with the other as an injury may result if the screwdriver slips out of the slot.
- 5.16 Do not hammer screws that cannot be turned.
- 5.17 Do not grind the screwdriver tip to fit another size screw head.
- 5.18 Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-fluted spline screw heads).
- 5.19 Do not use defective screwdrivers (e.g. rounded or damaged edges or tips; split or broken handles; bent shafts).
- 5.20 Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.
- 5.21 Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should be used only on the square screwdriver shank designed for that purpose.
- 5.22 Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.
- 5.23 Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.
- 5.24 Do not carry screwdrivers in clothing pockets.

6.0 Snips

- 6.1 Wear safety glasses and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.
- 6.2 Snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines and in curves to the left or right.
- 6.3 Select the right size and type of snips for the job; check the manufacturer's specifications about the intended use of the snips (e.g., type of cut - straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).
 - 6.3.1 Universal snips can cut in both straight and wide curves.
 - 6.3.2 Straight snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are generally designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.
 - 6.3.3 Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.
 - 6.3.4 Aviation snips have compound leverage that reduces the effort required for cutting.
 - 6.3.5 Offset snips have jaws that are set at an angle from the handle.
- 6.4 Use only snips that are sharp and in good condition.
- 6.5 Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.
- 6.6 Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.
- 6.7 Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.
- 6.8 Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.
- 6.9 Keep the nut and the pivot bolt properly adjusted at all times.
- 6.10 Oil the pivot bolt on the snips occasionally.
- 6.11 Do not try to cut sharp curves with straight cut snips.
- 6.12 Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16-gauge cold, rolled steel or 18-gauge stainless steel). Do not extend the length of handles to gain greater leverage.
- 6.13 Do not hammer or use your foot to exert extra pressure on the cutting edges.
- 6.14 Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.
- 6.15 Do not attempt to re-sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

7.0 Wrenches

- 7.1 Use the correct wrench for the job - pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.
 - 7.1.1 Do not use pipe wrenches on nuts and bolts.
 - 7.1.2 Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.
 - 7.1.3 Do not use a conventional adjustable wrench for turning a tap – it will cause uneven pressure on the tap that may cause it to break.
 - 7.1.4 Do not use a makeshift wrench.

- 7.2 Inspect pipe wrenches periodically for worn or unsafe parts and replace them:
 - 7.2.1 Wrenches must not be used when jaws are sprung to the point that slippage occurs.
 - 7.2.2 Ensure that the teeth of a pipe wrench are sharp, clean and free of oil and debris.
 - 7.2.3 Do not use worn adjustable wrenches. Inspect the threads, knurl, jaw and pin for wear.
 - 7.2.4 Discard any bent or damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).
- 7.3 Select the correct jaw size to avoid slippage.
 - 7.3.1 Ensure that the jaw of an open-ended wrench is in full contact (fully seated, "flat," not tilted) with the nut or bolt before applying pressure.
 - 7.3.2 Face a pipe wrench or adjustable wrench "forward," adjust tightly and turn the wrench so pressure is against the permanent or fixed jaw. Do not pull on a wrench that is loosely adjusted.
 - 7.3.3 Adjust the pipe wrench grip to maintain a gap between the back of the hook jaw and the pipe. This concentrates the pressure at the jaw teeth, producing the maximum gripping force. It also aids the ratcheting action.
 - 7.3.4 Do not insert a shim in a wrench for better fit.
 - 7.3.5 Before applying pressure, ensure that the jaws have a good bite.
 - 7.3.6 Make sure adjustable wrenches do not "slide" open during use.
 - 7.3.7 Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length. Use a larger wrench as necessary.
- 7.4 Ensure that the pipe or fitting is clean to prevent unexpected slippage and possible injury.
- 7.5 Maintain a proper stance with feet firmly placed to maintain balance.
 - 7.5.1 Position the body in a way that will prevent loss of balance and injury if the wrench slips or something (e.g., a bolt) suddenly breaks.
 - 7.5.2 Pull, rather than push on the wrench handle as body balance is more likely to be maintained if the wrench slips.
 - 7.5.3 Pull using a slow, steady pull; do not use fast, jerky movements.
- 7.6 Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for the direction you are applying pressure.
- 7.7 Support the head of the ratchet wrench when socket extensions are used.
- 7.8 Stand aside when work is done with wrenches overhead.
- 7.9 Do not use a wrench on moving machinery.
- 7.10 Do not use the wrong tools for the job. For example: Do not use pliers instead of a wrench or a wrench as a hammer. Do not use pipe wrenches for lifting or bending pipes.
- 7.11 Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.
- 7.12 Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.

8.0 Files/Rasps

- 8.1 Do not use a file as a pry bar, hammer, screwdriver, or chisel.
- 8.2 When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.
- 8.3 Do not hammer on a file.

9.0 Chisels and Punches

- 9.1 Use the right size and type of chisel (metal or wood) or punch (drift pin, centre, pin) for the job.
- 9.2 Use tools only if they are good condition (i.e., cutting edges are sharp, struck head is not mushroomed or chipped).
 - 9.2.1 Do not use chisels or punches if the cutting edge is dull, mushroomed or chipped, or if the point of a punch is slanted or damaged.
 - 9.2.2 Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel. Replace broken or splintered handles.
 - 9.2.3 Redress striking tools with burred or mushroomed heads.
 - Redress the point or cutting edge to its original shape.
 - Do not use a grinder to redress heat-treated tools. Use a whetstone.
 - Grind to a slightly convex cutting edge.
 - The point angle of the chisel should be 70° for hard metals, 60° for soft.
 - Do not apply too much pressure to the head when grinding a chisel. The heat generated can remove the temper. Immerse the chisel in cold water periodically when grinding.
 - 9.2.4 Replace any chisel or punch that is bent, cracked, shows excessive wear or cannot successfully be redressed.
- 9.3 Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling or punching.
- 9.4 Hold the chisel, for shearing and chipping, at an angle which permits the bevel of the cutting edge to lie flat against the shearing plane.
- 9.5 Use the appropriate type and size of hammer for the chisel or punch, such as:
 - 9.5.1 A wooden or plastic mallet with a large striking face on chisels.
 - 9.5.2 Heavy-duty or framing chisels made of a solid or molded handle can be struck with a steel hammer.
 - 9.5.3 Ball-peen hammers are generally chosen for use with punches.
 - 9.5.4 Refer to the 'Hammers' section of this document for further guidance.
- 9.6 Chip or cut away from the body. Keep hands and body behind the cutting edge.
- 9.7 Make finishing or paring cuts with hand pressure alone.
- 9.8 Provide hand protection if possible:
 - 9.8.1 Use a sponge rubber shield, punch or chisel holder.
 - 9.8.2 Clamp small work pieces in a vise and chip towards the stationary jaw when working with a chisel.
 - 9.8.3 Do not allow ball point chisels to be hand-held by one employee and struck by another. Use tongs or a chisel holder to guide the chisel so that the holder's hand will not be injured.
- 9.9 Do not use cold chisels for cutting or splitting stone or concrete.
- 9.10 Do not use a drift pin punch (also called an aligning punch) as a pin punch intended for driving, removing, or loosening pins, keys, and rivets.
- 9.11 Do not use a wood chisel on metal.
- 9.12 Do not use a wood chisel as a pry or a wedge.
- 9.13 Place chisels safely within the plastic protective caps to cover cutting edges when not in use.

- 9.14 Store chisels in a “storage roll,” a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.

10.0 Hacksaws

- 10.1 Select correct blade for material being cut.
- 10.2 Keep saw blades clean and lightly oiled using light machine oil on the blade to keep it from overheating and breaking.
- 10.3 Secure blade with the teeth pointing forward. Tighten the nut until the blade is under tension.
- 10.4 Keep blade rigid, and frame properly aligned.
- 10.5 Cut using steady strokes, directed away from you.
- 10.6 Use entire length of blade in each cutting stroke.
- 10.7 Cut harder materials more slowly than soft materials.
- 10.8 Clamp thin, flat pieces requiring edge cutting.
- 10.9 Do not apply too much pressure on the blade as the blade may break.
- 10.10 Do not twist when applying pressure.
- 10.11 Do not use when the blade becomes loose in the frame.

11.0 Vises

- 11.1 When clamping a long work piece in a vise, support the far end of the work piece by using an adjustable pipe stand, saw horse or box.
- 11.2 Position the work piece in the vise so that the entire face of the jaw supports the work piece.
- 11.3 Do not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.
- 11.4 Do not slip a pipe over the handle of a vise to gain extra leverage.

12.0 Clamps

- 12.1 Do not use a C-clamp for hoisting materials.
- 12.2 Do not use a C-clamp as a permanent fastening device.

13.0 Pry Bars

- 13.1 Establish balance and stable footing when using a bar for prying.
- 13.2 Pry bars must be appropriate to the task to prevent slipping or tool breakage.

14.0 Jacks

- 14.1 All jacks—including lever and ratchet jacks, screw jacks, and hydraulic jacks—must have a stop indicator, and the stop limit must not be exceeded.
- 14.2 The manufacturer’s load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.
- 14.3 A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Put a block under the base of the jack when the foundation is not firm, and place a block between the jack cap and load if the cap might slip.
- 14.4 To set up a jack, make certain of the following:

- 14.4.1 The base of the jack rests on a firm, level surface;
 - 14.4.2 The jack is correctly centered;
 - 14.4.3 The jack head bears against a level surface; and
 - 14.4.4 The lift force is applied evenly.
- 14.5 Clear all tools, equipment and any other obstructions from under the load before lowering the jack.
- 14.6 Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly. In addition, each jack must be inspected according to the following schedule:
- 14.6.1 For jacks used continuously or intermittently at one site—inspected at least once every 6 months;
 - 14.6.2 For jacks sent out of the shop for special work—inspected when sent out and inspected when returned; and
 - 14.6.3 For jacks subjected to abnormal loads or shock—inspected before use and immediately thereafter.

Small Engines

S3AM-305-ATT16

1.0 Objective / Overview

- 1.1 Operate small engine machines (liquid fuel tools), such as push mowers, weed trimmers, pumps and leaf blowers, in a safe manner.
- 1.2 Workers must be trained and competent in the safe operation and maintenance of the tool.

2.0 Potential Hazards

- 2.1 Flying debris
- 2.2 Noise
- 2.3 Moving and sharp parts
- 2.4 Hot surfaces

3.0 Safe Operating Guidelines

- 3.1 Review *S3AM-305-PR1 Hand & Power Tools* and the manufacturer's operating manual for further guidance.
- 3.2 Do not wear loose or baggy clothing around tools with rotating parts.
- 3.3 Never run the engine indoors, in poorly ventilated areas, or in a location where the exhaust could be drawn into a building through an opening.
 - 3.3.1 When an engine must be operated in an enclosed space, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide.
- 3.4 Never store engine with fuel in fuel tank inside a building with potential sources of ignition such as hot water and space heaters, clothes dryers, electric motors, etc.
- 3.5 Ensure the fuel cap is in place. Never start or operate the engine with the fuel fill cap removed.
- 3.6 Refuelling:
 - 3.6.1 Never remove fuel cap or add fuel when engine is running.
 - 3.6.2 Shut down the engine and allow it to cool prior to refueling to prevent accidental ignition of hazardous vapors.
 - 3.6.3 Never pour gasoline on hot surfaces.
 - 3.6.4 Fill in well-ventilated area.
 - 3.6.5 Do not re-fuel around an open flame or while smoking.
- 3.7 Use only properly labelled, American National Standards Institute/Canadian Standards Association-approved red gasoline containers to store and dispense fuel.
- 3.8 The worker must be careful to handle, transport, and store gas or fuel only in approved flammable liquid containers, according to proper procedures for flammable liquids.
- 3.9 Noise hazards associated with gasoline engines must be mitigated by the use of proper hearing protection. Ear plugs, ear muffs or a combination of the two must be used to protect workers from excessive noise levels.
- 3.10 Appropriate fire extinguishers must also be available in the area.

- 3.11 Do not pour fuel from engine or siphon fuel by mouth.
- 3.12 Never leave the engine unattended while it is running.
- 3.13 Never operate the engine with an unguarded engine shaft.
- 3.14 Do not modify the engine or tamper with the factory setting of the engine governor.
- 3.15 Never operate the engine without a muffler guard in place and avoid touching hot areas of the engine.
- 3.16 Keep all flammable materials away from the muffler and the rest of the engine; do not idle or park the engine in dry grass or ground cover.
- 3.17 When working on the equipment, avoid accidental starts by removing the ignition key, turn off all engine switches, disconnect the battery and disconnect the spark plug, keeping it away from metal part.

4.0 Personal Protective Equipment

- 4.1 Always wear safety glasses with shields. Add face shield if potential for flying debris.
- 4.2 Gloves providing the appropriate protection (e.g. impact, abrasion, chemical, etc.).
- 4.3 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts. Long pants and long sleeve shirt.
- 4.4 Safety toe work boots.
- 4.5 Hearing protection (earmuffs or earplugs).

Electric & Battery Hand Tools

S3AM-305-ATT17

1.0 Objective / Overview

- 1.1 Electric and battery hand tools, also known as power tools, allow the user to perform their task more easily by providing more torque, speed, etc.

2.0 Hazards

- 2.1 Electricity

3.0 Safe Work Practices (General)

- 3.1 Review manufacturer's operating manual and *S3AM-305-PR1 Hand & Power Tools* for additional guidelines.
- 3.2 All electrical tools and equipment must be operated in accordance with the requirements of *S3AM-302-PR1 Electrical Safety*.
- 3.3 Keep all people not involved with the work at a safe distance from the work area.
- 3.4 Inspect power tools prior to each use.
 - 3.4.1 Ensure that the power tool has the correct guard, shield or other attachment that the manufacturer recommends.
 - 3.4.2 Ensure that the tools are properly grounded using a three-prong plug (no loose or faulty prongs), are double insulated (and are labeled as such), or are powered by a low-voltage isolation transformer; this will protect users from an electrical shock.
 - 3.4.3 Check the handle and body casing of the tool for cracks or other damage.
 - 3.4.4 If the tool has auxiliary or double handles, check to see that they installed securely.
 - 3.4.5 Inspect cords for defects: check the plug and power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
 - 3.4.6 Ensure power tool switches and triggers are fully functional.
 - 3.4.7 If equipped with a trigger-lock, ensure it is disabled.
 - 3.4.8 If a power tool is defective, remove it from service, and tag it clearly "Out of service for repair" or "Do Not Use". Replace damaged equipment immediately – do not use defective tools "temporarily."
DO NOT ATTEMPT FIELD REPAIRS.
- 3.5 Maintain tools with care; keep them sharp and clean for best performance.
- 3.6 Follow instructions in the user's manual for lubricating and changing accessories.
- 3.7 Do not over-reach. Be sure to keep good footing and maintain good balance when operating power tools.
- 3.8 If they are available, choose tools with double handles to permit easier holding and better manipulation of the tool.
- 3.9 Do not brush away sawdust, shavings or turnings while the power tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.
- 3.10 Do not operate power tools that are not specified as intrinsically safe in an area containing explosive vapors or gases.
- 3.11 Do not clean tools with flammable or toxic solvents.
- 3.12 Do not surprise or touch anyone who is operating a power tool. Startling an operator could result in injury or

property damage.

- 3.13 Hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released.
 - 3.13.1 Powered hand tools shall not be capable of being locked in the ON position. Trigger locks are not permitted.
 - 3.13.2 All power tools should be ordered without trigger locks; if a tool is found with a trigger lock intact it must be disabled.
- 3.14 Avoid accidental starting. Do not hold fingers on the switch button, and ensure it is in the OFF position while plugging the tool in or while carrying an energized (plugged-in, battery in place) tool.
- 3.15 Do not leave a running tool unattended and ensure the power tool will not re-energize when not in use and when servicing, cleaning, making adjustments, applying flammable solutions or changing accessories:
 - 3.15.1 Ensure it has stopped running completely.
 - 3.15.2 Ensure the trigger or switch is OFF.
 - 3.15.3 Ensure the power tool is disconnected from the power supply (unplugged or battery removed).
- 3.16 Operate power tools within their design limitations.
- 3.17 Store power tools, batteries and electrical cords in a clean, dry area off the ground when not in use.
- 3.18 Do not use power tools in damp or wet locations unless they are approved for that purpose.
- 3.19 Keep work areas well lighted when operating power tools.
- 3.20 Equipment must have proper guards or shields and they must remain in place to protect the operator and others from the following:
 - 3.20.1 Point of operation.
 - 3.20.2 In-running nip points.
 - 3.20.3 Rotating parts.
 - 3.20.4 Flying chips and sparks.
- 3.21 If a guard is removed to clean or repair parts, replace it before testing the equipment and returning the machine to service
- 3.22 If, due to damage or deterioration, the original guard provided on a piece of equipment cannot be put in place, the tool must be removed from service.
- 3.23 Do not modify, remove, or disable any machine guards.
- 3.24 Remove any wrenches and adjusting tools before turning on a tool.
- 3.25 Use clamps, a vice or other devices to hold and support the piece being worked on, when practical to do so. This will allow you to use both hands for better control of the tool and will help prevent injuries if a tool jams or binds in a work piece.

4.0 Battery Powered Tools

- 4.1 Use only the type of battery specified by the tool manufacturer for the battery-powered tool to be used.
- 4.2 Recharge a battery or battery-powered tool only with a charger that specified for the battery.
- 4.3 Store a battery pack safely so that no metal parts, nails, screws, wrenches and so on can come in contact with the battery terminals; this could result in shorting out the battery and possibly cause sparks, fires or burns.

5.0 Safe Work Practice (Electric)

- 5.1 During use, keep power cords clear of tools and the path that the tool will take.
- 5.2 Employees' hands shall not be wet when plugging and unplugging cord and plug connected equipment and extension cords.
- 5.3 Portable electric equipment shall be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.
- 5.4 Portable electric equipment and extension cords used in potentially wet locations shall be approved for use in those locations by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation (e.g., F.M., UL, etc.).
- 5.5 The outlet box for portable extension cords for outdoor use shall be weatherproof and shall be maintained in good condition.
- 5.6 Maintain electrical cords and connections in good working order:
 - 5.6.1 Cords and connection must be American National Standards Institute/Canadian Standards Association approved and bear a standardized certification marking (e.g., CSA, ANSI, UL, CE etc.).
 - 5.6.2 To prevent overheating, use only approved extension cords that have the proper wire size for the length of cord and power requirements of the electric tool to be used.
 - Do not connect or splice extension cords together to make a longer connection.
 - For outdoor work, use outdoor extension cords marked "W-A" or "W."
 - 5.6.3 Eliminate octopus connections: if more than one receptacle plug is needed, use a power bar or power distribution strip that has an integral power cord and a built-in overcurrent protection.
 - 5.6.4 Portable electrical equipment shall not be carried by the cord, nor raised or lowered by the cord.
 - 5.6.5 Electrical cords shall not be removed from a receptacle by pulling on the cord line.
 - 5.6.6 Cords shall not be placed across walkways unless appropriate cord and worker protection is in place to prevent damage to the cord and worker tripping hazards (e.g. cable protectors, cords suspended over walkway, etc.).
 - 5.6.7 Do not walk on or allow vehicles or other moving equipment to pass over unprotected power cords. Cords should be put in conduits or protected by placing planks on each side of them.
 - 5.6.8 A cord should not be pulled or dragged over nails, hooks, or other sharp objects that may cause cuts in the insulation.
 - 5.6.9 Keep cords away from heat, oil, sharp edges and moving parts.
 - 5.6.10 Never use extension cords as permanent wiring as they are for temporary use only. Do not run behind bookshelves, or furniture if the cord cannot be monitored for severe bending or damage.
 - 5.6.11 Inspect cords frequently for such damage such as fraying, kinks, cuts, and cracked or broken outer jackets. Any cord that exhibits damage or feels more than comfortably warm to the touch shall be removed from service, tagged "Do Not Use" and checked by an electrician.
 - 5.6.12 Do not tie power cords in knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.
- 5.7 Electrical shock associated with power tool use can cause heart failure and burns, as well as injury from falls. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death.
 - 5.7.1 Verify that the power source is the same voltage and current as indicated on the nameplate of the tool. Using a higher voltage can cause serious injury to the operator as well as burn out the tool.
 - 5.7.2 All electrical connections for these tools must be suitable for the type of tool and the working

conditions (wet, dusty, flammable vapors).

- 5.7.3 To protect the worker from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer.
- 5.7.4 All outdoor receptacles must be protected by means of a ground fault circuit interrupter (GFCI or GFI) available in portable or fixed models. Do not use any electric power tools outdoors in a receptacle that is not properly protected.
- 5.7.5 Three-wire cords contain two current-carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground.
- 5.7.6 The third prong must never be removed from the plug.
- 5.7.7 Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.
- 5.7.8 Avoid body contact with grounded surfaces like refrigerators, pipes and radiators when using electric powered tools; this will reduce the likelihood of shock if the operator's body is grounded.
- 5.7.9 Report all shocks and/or sparks from electrical tools, no matter how minor. The tool in question should be tagged out and not be used until it has been checked for ground fault.
- 5.8 Only authorized persons are permitted to activate, de-activate or lockout electrical equipment.
- 5.9 Where there is or may be a danger to a worker, from the inadvertent operation of electrical equipment, then that equipment must be locked out and tagged prior to commencing work. Refer to *S3AM-325-PR1 Lockout Tagout*.
 - 5.9.1 Switch off all appropriate devices (MCC, Distribution Panel, Disconnect).
 - Stand to one side when engaging or disengaging an electrical circuit breaker to avoid electrical flash backs Lock and tag Electrical Supply devices in the "OFF" position.
 - 5.9.2 Test to be sure the equipment cannot be operated at the STOP-START switch.
 - 5.9.3 Test to be sure electrical equipment is de-energized.
 - 5.9.4 After completion of task, remove padlocks and destroy tags.

6.0 Personal Protective Equipment (Level D PPE)

- 6.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.
- 6.2 Use gloves with protection appropriate to the task (e.g. impact, abrasion, puncture, etc.).
- 6.3 Safety toed boots.
- 6.4 Use hearing protection as necessary.
- 6.5 Kickback aprons as necessary.
- 6.6 Wear safety glasses with side shields at all times (or safety goggles) and face shield if flying debris may be encountered.

7.0 Belt Sanders

- 7.1 Refer to *S3AM-305-ATT11 Sanders*.

8.0 Drills

- 8.1 Refer to *S3AM-305-ATT8 Power Drill*.

9.0 Planers and Joiners

- 9.1 Use blades of the same weight and set at the same height.
- 9.2 Ensure that the blade-locking screws are tight.
- 9.3 Guard planers and joiners to prevent contact with the blades throughout the full length of the cutting area.
- 9.4 Support the material (stock) in a comfortable position that will allow the job to be done safely and accurately.
- 9.5 Check stock thoroughly for staples, nails, screws, or other foreign objects before using a planer.
- 9.6 Start a cut with the infeed table (front shoe) resting firmly on the stock and with the cutter head slightly behind the edge of the stock.
- 9.7 Use two hands to operate a planer - one hand on the trigger switch and the other on a front handle.
- 9.8 Do not put fingers or any object in a deflector to clean out chips while a planer is running.
- 9.9 Disconnect the power supply when stopping to dump out chips.
- 9.10 Do not set a planer down until blades have stopped turning.
- 9.11 Keep all cords clear of cutting area.

10.0 Routers

- 10.1 Ensure that the bit is securely mounted in the chuck and the base is tight.
- 10.2 Put the base of the router on the work, template or guide. Make sure that the bit can rotate freely before switching on the motor.
- 10.3 Secure stock. Never hold or have another individual hold the material. Sudden torque or kickback from the router can cause damage and injury.
- 10.4 Before using a router, check stock thoroughly for staples, nails, screws or other foreign objects.
- 10.5 Keep all cords clear of cutting area.
- 10.6 Always hold both hands on router handles, until a motor has stopped. Do not set the router down until the exposed router bit has stopped turning.
- 10.7 When inside routing, start the motor with the bit above the stock. When the router reaches full power, lower the bit to two times the required depth.
- 10.8 When routing outside edges, guide the router counter clockwise around the work.
- 10.9 When routing bevels, moldings and other edge work, make sure the router bit is in contact with the stock to the left of a starting point and is pointed in the correct cutting direction.
- 10.10 Feed the router bit into the material at a firm, controlled speed.
- 10.11 Softwood may enable fast router cutting speed. With hardwood, knotty and twisted wood, or with larger bits, cutting may be very slow.
- 10.12 The sound of the motor can indicate safe cutting speeds. When the router is fed into the material too slowly, the motor makes a high-pitched whine. When the router is pushed too hard, the motor makes a low growling noise.
- 10.13 When the type of wood or size of the bit requires going slow, make two or more passes to prevent the router from burning out or kicking back.
- 10.14 To decide the depth of cut and how many passes to make, test the router on scrap lumber similar to the work.

11.0 Circular Saws

- 11.1 Refer to *S3AM-305-ATT2 Circular Saw*.

12.0 Other Saws

- 12.1 Use lubricants when cutting metals.
- 12.2 Keep all cords clear of cutting area.
- 12.3 Cut green or wet material slowly and with caution. Check all material being cut for nails, hard knots, etc.
- 12.4 Make sure guards are installed and are working properly.
- 12.4.1 Table saws must be fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.
- Exposed parts of the saw blade under the table must be properly guarded.
 - All swing cutoff and radial saws that are drawn across a table with limit stops to prevent the saw from traveling beyond the edge of the table
- 12.4.2 Ensure band saw blades are fully enclosed except at the point of operation.
- 12.4.3 Ensure swing cut-off saws have a guard completely covering the upper half of the saw.
- 12.5 Remember sabre saws cut on the upstroke.
- 12.6 Position the saw beside the material before cutting and avoid entering the cut with a moving blade.
- 12.7 Secure and support stock as close as possible to the cutting line to avoid vibration.
- 12.7.1 Hold the material being cut firmly against a back guide or fence and cut with a single, steady pass.
- 12.7.2 Use a push stick or guide when cutting operation requires the hands of the operator to come close to the blade.
- 12.7.3 When cutting long stock, provide extension tables and a helper to assist the operator.
- 12.7.4 Keep the base or shoe of the saw in firm contact with the stock being cut.
- 12.7.5 Automatic feed devices should be used whenever feasible.
- 12.8 Select the correct blade for the material being cut and allow it to cut steadily. Do not force it. Clean and sharp blades operate best.
- 12.9 Set the blade to go no further than 1/8 to 1/4 inch deeper than the material being cut.
- 12.10 Do not start cutting until the saw reaches its full power.
- 12.11 Do not force a saw along or around a curve. Allow the machine to turn with ease.
- 12.12 Do not insert a blade into or withdraw a blade from a cut or lead hole while the blade is moving.
- 12.13 Do not put down a saw until the motor has stopped.
- 12.14 Do not reach under or around the stock being cut.
- 12.15 Maintain control of the saw always. Avoid cutting above shoulder height.
- 12.16 External Cuts
- 12.16.1 Make sure that the blade is not in contact with the material or the saw will stall when the motor starts.
- 12.16.2 Hold the saw firmly down against the material and switch the saw on.
- 12.16.3 Feed the blade slowly into the stock, maintaining an even forward pressure.

12.17 Internal Cuts

12.17.1 Drill a lead hole slightly larger than the saw blade. With the saw switched off, insert the blade in the hole until the shoe rests firmly on the stock.

12.17.2 Do not let the blade touch the stock until the saw has been switched on.

Americas

Hand & Power Tool Maintenance Inventory

S3AM-305-FM1

EQUIPMENT (MAKE, MODEL, SERIAL #)	EQUIPMENT OWNER	EQUIPMENT STATUS (ON HIRE, ACTIVE, DECOMMISSIONED)	FREQUENCY OF SERVICE	SERVICE TYPE	MANUFACTURER'S STANDARDS	INDUSTRY STANDARDS	LEGISLATED REQUIREMENTS	LOCATION OF EQUIPMENT

Americas

Hand & Power Tool Inspection Report

S3AM-305-FM2

[illegible]

Wildlife, Plants & Insects

S3AM-313-PR1

1.0 Purpose and Scope

- 1.1 Communicates the requirements and precautions to be taken by AECOM employees to protect against the biological hazards associated with insects, arachnids, snakes, poisonous plants, and other animals referred to herein collectively as “biological hazards”.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document’s content.

2.0 Terms and Definitions

- 2.1 **Field Work** – Any activity conducted at a site that contains brush, overgrown grass, leaf litter, poisonous plants, or is located near mosquito breeding areas and includes work in structures where animals might exist that harbor fleas or ticks or where spiders and mites could be present. Field work includes, but is not limited to, Phase I, Phase II, Operations Monitoring & Maintenance, biological surveys, and other work that meets the definition of field work.
- 2.2 **Poisonous** – Capable of harming or killing by or as if by poison; toxic or venomous.
- 2.3 **Phase I Environmental Site Assessment** – Investigation of real property to determine the possibility of contamination, based on visual observation and property history, but no physical testing. Under new Environmental Protection Agency regulations that went into effect on November 1, 2006, a Phase I, as it is called for short, will be mandatory for all investors who wish to take advantage of Comprehensive Environmental Response, Compensation, and Liability Act defenses that will shield them from liability for future cleanup, should that prove necessary. The new Phase I rules, called “All Appropriate Inquiry” or AAI, also require more investigation than previously mandated. Investors can expect to see dramatic price increases over prior experiences.
- 2.4 **Phase II Environmental Site Assessment** – Investigation of real property through physical samplings and analyses to determine the nature and extent of contamination and, if indicated, a description of the recommended remediation method.

3.0 References

- 3.1 RS2-001-PR1 Firearms Standard
- 3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation
- 3.3 S3AM-008-PR1 Fitness for Duty
- 3.4 S3AM-113-PR1 Heat Stress
- 3.5 S3AM-208-PR1 Personal Protective Equipment
- 3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

- 4.1 Roles and Responsibilities
 - 4.1.1 **Managers / Supervisors**
 - Responsible for managing field work.

- Work with employees to see that a Task Hazard Analysis (THA) for the work to be conducted has been performed prior to the beginning of the field work and that it includes an assessment of potential biological hazards.
- Implement control measures at the location to reduce the potential for employees to be exposed to injuries and illnesses from biological hazards while working.
- If the exposures cannot be eliminated or managed with engineering controls, approve the use and cost of Personal Protective Equipment (PPE) and protective repellents and lotions and confirm that exposed employees have and use these products.

4.1.2 **SH&E Manager**

- Confirm training and guidance is provided to employees consistent with this procedure.
- During the performance of site visits, assess the precautions being taken against biological hazards for compliance with this procedure.
- Assist AECOM personnel in identifying hazards and selecting appropriate control measures.
- As applicable, review and approve relevant SH&E Plans for locations that have biological hazards.

4.1.3 **Employees**

- Participate in required training related this procedure.
- Participate in the development of THAs for the task, identify control measures to limit exposure and request PPE, repellents, and protective lotions identified by this procedure.
- Update the applicable THA when a new, unaccounted for biological hazard is identified. Employee shall stop work to identify appropriate elimination or control measures (and obtain any necessary guidance) before continuing work.
- Obtain approval from Managers and/or Supervisors to purchase selected PPE prior to purchasing.
- Implement the precautions appropriate to prevent exposure to the hazardous wildlife, insects and plants.
- Observe requirements for reporting (e.g. tick bites, skin irritations, etc.) as detailed within the procedure and attachments.

4.2 **Training**

4.2.1 Employees shall be trained to recognize organisms that represent a threat in the regions in which they work – experienced field staff shall provide on the job training to assist staff with hazard recognition.

4.2.2 Employees shall be properly trained to the anticipated tasks and the associated required PPE.

4.3 **Overview**

4.3.1 The procedures discussed below are detailed because these hazards have historically posed the most significant risk to AECOM employees. Note that this discussion is not a fully encompassing list of hazards. As part of the SH&E Plan and THA developed by the AECOM personnel, in accordance with *S3AM-209-PR1 Risk Assessment & Management*, additional consideration shall be given to other biological hazards.

4.3.2 Departments of Public Health local to the worksite, as well as the Centers for Disease Control (CDC) can serve as a resource for identifying biological hazards not discussed in this procedure.

4.3.3 If additional biological hazards are identified, employees should stop work and contact the SH&E Manager to discuss the hazards and identify effective control measures. Those control measures shall be implemented at the location prior to restarting work.

4.4 Employee Sensitivity

- 4.4.1 Sensitivity to toxins generated by plants, insects and animals varies according to dosage and the ability of the victim to process the toxin; therefore, it is difficult to predict whether a reaction will occur, or how severe the reaction will be. Employees should be aware that there are a large number of organisms capable of causing serious irritations and allergic reactions. Some reactions will only erupt if a secondary exposure to sunlight occurs. Depending on the severity of the reaction, the result can be severe scarring, blindness or even death.
- 4.4.2 Employees also need to consider whether they are sensitive to the use of insect repellents.

4.5 Planning and Hazard Assessment

- 4.5.1 AECOM personnel shall confirm that the potential for exposure to specific biological hazards are assessed prior to the commencement of work and that the procedures specified by this procedure are integrated into the THA planning process and conveyed to employees conducting the field work. This information shall be communicated in the location-specific SH&E plan, the THA, pre-project kickoff meetings, and tailgate meetings at the location.
- 4.5.2 It is important to note that the precautions to be taken by employees to decrease the risk of exposure to biological hazards can directly increase the risk of heat-related illness due to thermal stresses. Therefore, heat stress monitoring and precautions shall be included as a critical component of the task-specific THA in accordance with *S3AM-511-PR1 Heat Stress*.
- 4.5.3 During the preparation of the location-specific SH&E plan and task specific THA, Managers, Supervisors, and employees shall determine what biological hazards might be encountered during the task or operations and shall prescribe the precautions to be taken to reduce the potential for exposure and the severity of resulting illnesses. Consideration will be given to conditions such as weather, proximity to breeding areas, host animals, and published information discussing the presence of the hazards.
- 4.5.4 It should be assumed that at least one of the biological hazards exists whenever working on undeveloped property. This can include insect activity any time that local temperatures exceed 40 degrees Fahrenheit (4.5 degrees Celsius) for a period of more than 24 hours. The stubble and roots of poisonous plants can be a hazard any time of year, including when some plants are dormant or mown.
- 4.5.5 The hazard assessments shall also consider the additional hazards posed by vegetative clearing such as the increased risk of coming in contact with poison ivy, oak or sumac and hazards associated with the use of tools and equipment to remove vegetation.
- 4.5.6 Employees in the field where biological hazards exist shall not enter the hazard areas unless they are wearing the appropriate protective clothing, repellents, and barrier creams specified below. If the hazard is recognized in the field but was not adequately assessed during the THA, the field staff shall stop work and not proceed until the THA has been amended and approved and protective measures implemented.
- 4.5.7 Employees who have severe allergic reactions are strongly recommended to notify their Manager, field Supervisor and co-workers of the potential for a reaction and demonstrate what medication they might need, where they keep it and how it is administered.
- 4.5.8 A decision flow chart and table for determining the potential for biological hazards in the Americas has been provided in *S3AM-313-ATT1 Biological Hazard Assessment Flow Chart*.

4.5.9 Restrictions:

- No firearms or weapons are allowed to be used without express permission by the Region Executive and Chief Resilience Officer, refer to the *RS2-001-PR1 Firearms Standard*.
- No weapons related work shall occur without an assessment that includes appropriate hazard control measures and training.

- Staff with life-threatening reactions shall not undertake work in areas infested with the allergen (e.g., wasps, poison ivy), unless precautions are met which satisfy a medical practitioner's requirements. Refer to *S3AM-008-PR1 Fitness for Duty*.

4.5.10 Precautions

- Be aware of the potential irritants in your area and know how to recognize them.
- Modify activities to avoid encounters (diurnal rhythms, seasonal rhythms).
- Avoid wearing perfume and cologne and strong smelling deodorants, lotions, soaps, and shampoos.
- When working in areas where there may be small insects that "hitchhike" (e.g., ticks, spiders, scorpions), it is recommended that clothes are turned inside out and shaken at the end of day; do not wear same clothes two days in a row.
- Staff should always be aware of where they are placing their hands, or where they are sitting in order to avoid contact with potential toxins. Avoid reaching into areas where visibility is limited.

4.6 Wildlife Hazards (Wild Animals, Reptiles and Birds)

4.6.1 Employees shall not work alone in areas where the risk of an encounter with dangerous wildlife is high. Wildlife handling shall only be completed under direct supervision of an experienced individual. Refer to the following work instructions for more specifics:

- *S3AM-313-ATT13 Alligators*
- *S3AM-313-ATT9 Large Carnivores & Ungulates*
- *S3AM-313-ATT10 Bear Safety*
- *S3AM-313-ATT11 Small Mammals*
- *S3AM-313-ATT12 Snakes & Scorpions*

4.7 Ticks, Spiders and other Insects

4.7.1 Insects for which precautionary measures should be taken include but are not limited to: mosquitoes (potential carriers of disease aside from dermatitis), black flies, wasps, bees, ticks, fire ants and European fire ants.

4.7.2 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with them. Epi-pens¹ shall be carried at all times in the field by employees who are aware that anaphylactic shock is a possibility for them. AECOM highly recommends that employees with known allergies inform their co-workers of the allergy and the location of the medications they might carry for the allergy.

4.7.3 Habitat Avoidance, Elimination and/or Control

- The most effective method to manage worker safety and health is to eliminate, avoid and/or control hazards. Clearing the location of brush, high grass and foliage reduces the potential for exposure to biological hazards. Clearing will not eliminate the exposure to flying insects and there might be an increased exposure to ticks and spiders during the clearing process.
- Projects such as subsurface environmental assessment or remediation are often candidates for brush and overgrown grass to be cleared. In these instances, the Manager shall either request that the client eliminate vegetation, or request approval from the client to have vegetation clearing added to the scope of work.
 - o It should be noted that vegetation clearance may unintentionally serve to spread noxious and poisonous plant materials around the site.

¹ *Epi-pens must be prescribed by a personal physician. Renew epi-pens on a regular schedule to ensure effectiveness and make sure your field companions know where it is and how to use it if you cannot self-administer the dose.*

- o As applicable, measures should be taken to prevent spread, such as but not limited to, confirming equipment and materials are not placed on affected areas, and equipment is decontaminated after use and before removal from site.
- When work shall be conducted in areas that cannot or may not be cleared of foliage, personal precautions and protective measures shall be prescribed.
- Mosquitoes breed in stagnant water and typically only travel a quarter mile (less than half a kilometer) from their breeding site. Whenever possible, stagnant water should be drained to eliminate breeding areas. Managers and client site managers should be contacted to determine whether water can be drained and the most appropriate method for draining containers, containment areas, and other objects of standing water.
- If water cannot be drained, products similar to Mosquito Dunks® can be placed in the water to control mosquitoes. Once wet, the Mosquito Dunks® kill the immature, aquatic stage of the mosquito. The active ingredient is a beneficial organism that is lethal to mosquito larvae, but harmless to fish, humans, and other animals. Mosquito Dunks® provide long-term protection for 30 days or more.

4.7.4 Ticks

- Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will attach themselves. The most serious concern is a possibility of contracting a disease.
- Data from the CDC indicates that tick-borne diseases have become increasingly prevalent. At the same time, tick repellents have become both safe and effective so it is possible to prevent the vast majority of bites and, therefore, most related illnesses. The use of permethrin is strongly advised.
- The most common and severe tick-borne illnesses in the U.S. are Lyme disease, Ehrlichiosis, and Rocky Mountain spotted fever. A summary table listing CDC informational resources for these diseases is provided in *S3AM-313-ATT2 Ticks* along with a listing of CDC information resources and maps showing the distribution of common tick-borne diseases in the U.S.
- When working in areas where ticks may occur, it is recommended that clothes are turned inside out and shaken at the end of day; do not wear the same clothes two days in a row.
- Employees should conduct a thorough full body tick check upon exiting the field. Shower within two hours of coming indoors to help wash away loose ticks. Clothes should be laundered in hot water or tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks.
- To remove ticks that are embedded in skin, utilize a tick key. Alternatively use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out. Follow AECOM incident reporting guidelines to report the tick bite within 4 hours and notify the Manager or Supervisor.
- Familiarize yourself with the characteristic bulls-eye pattern of Lyme disease infection surrounding the bite. If you notice this type of pattern or rash resulting from a tick bite, immediately report the issue to your supervisor and follow the incident reporting requirements for your business group.
- If you experience symptoms such as fever, headache, fatigue, and a skin rash, you should immediately visit a medical practitioner as Lyme disease is treated easily with antibiotics in the early stages, but can spread to the heart, joints, and nervous system if left untreated.

4.7.5 Chiggers

- Chiggers are mite larvae, approximately ½ millimeter in size, and typically invisible to the naked eye. While chiggers are not known to carry infectious diseases, their bites and resulting rashes and itching can lead to dermatitis and a secondary infection.
- Chiggers are typically active from the last hard freeze in the winter or spring to the first hard freeze. They are active all year in the Gulf Coast and tropical areas.

4.7.6 Spiders

- Spiders can be found in derelict buildings, sheltered areas, basements, storage areas, well heads and even on open ground. Spiders can be found year round in sheltered areas and are often present in well heads and valve boxes.
- Most spider bites produce wounds with localized inflammation and swelling. The Black Widow and Brown Recluse spiders in the U.S. and others outside the U.S. inject a toxin that causes extensive tissue damage and intense pain.
- Additional information on spider identification can be found in attachment *S3AM-313-ATT3 Poisonous Spider Identification*.

4.7.7 Mosquitoes

- When a mosquito bites, it injects an enzyme that breaks down blood capillaries and acts as an anticoagulant. The enzymes induce an immune response in the host that results in itching and local inflammation. The tendency to scratch the bite sites can lead to secondary infections.
- CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk. At least one of the Encephalitis strains listed below is known to exist in every area of the U.S. and in many other countries as well:
 - o Eastern Equine encephalitis
 - o Western Equine encephalitis
 - o West Nile Virus
 - o St. Louis encephalitis
 - o La Crosse encephalitis
- Mosquitoes can transmit the West Nile Virus and other forms of encephalitis after becoming infected by feeding on the blood of birds which carry the virus.
- Most people infected with the virus experience no symptoms or they have flu-like symptoms. Sometimes though, the virus can cause severe illness, resulting in hospitalization and even death, so proper precautions should be taken. Consult a medical practitioner if you suspect you have West Nile Virus. Other diseases including Dengue Fever and Malaria are spread by mosquitoes in the sub-tropic and tropical parts of the world. See *S3AM-313-ATT4 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.7.8 Bees, Wasps and Hornets

- Wasps and bees will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also, instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened.
- Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, behind covers or lids and even on open ground. Other protective measures are not normally effective against aggressive, flying insects. Be aware of the potential areas for these types of insects, approach these locations cautiously. Avoid reaching into areas where visibility is limited.
- If you see a nest in the area you are working in stop work. Contact the Manager or Site Supervisor for procedures to have the nest removed.

- If stung by a wasp, bee or hornet, notify a co-worker or someone who can help should you have an allergic reaction. Stay calm and treat the area with ice or cold water. Follow AECOM incident reporting guidelines to report the sting within 4 hours and notify the Manager or Supervisor immediately. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or sting, or any swelling or numbness beyond the site of the bite or sting.

4.7.9 Fire Ants

- The fire ant (southern and western U.S.) and the European fire ant (northeastern U.S. and eastern Canada) is often very abundant where it is established. It is very aggressive and commonly climbs up clothing and stings unprovoked when it comes into contact with skin. Painful irritations will persist for an hour or more.

4.7.10 Personal Protective Equipment (PPE)

- Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
- Gloves shall also be worn consistent with the recommendations of the site-specific SWP and/or THA to minimize hand exposure.
- Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically treated clothing will be taped to the work boots.
- See *S3AM-313-ATT2 Ticks* for configuration of clothing for protection against ticks and insects.
- Application of insect repellent to clothing and/or exposed skin. Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the CDC for effective protection against mosquitoes that may carry the West Nile virus and related diseases.
- Note that DEET will reduce the effectiveness of Fire Resistance Clothing (FRC) and should not be applied to this clothing. If working in FRC, employees can use Permethrin as it has been shown not to reduce the effectiveness of FRC. Permethrin will need to be applied to FRC well in advance of the planned work. If permethrin is unavailable employees can apply DEET to their skin and let dry prior to putting FRC on.
 - o Oil of Lemon Eucalyptus is a plant-based insect repellent on the market as Repel Lemon Eucalyptus. The products have been proven to be effective against mosquitoes, deer ticks, and no-see-ums for up to six hours. Derived from Oil of Lemon Eucalyptus, this non-greasy lotion or spray has a pleasant scent and is not known to be toxic to humans. The spray or lotions will be effective for approximately two to six hours and should be reapplied every two hours to sustain protection. Lemon Eucalyptus products cannot be applied to fire retardant clothing.
 - o Permethrin is an insecticide with repellent properties registered with the Environmental Protection Agency and recommended by the CDC.
 - Permethrin is highly effective in preventing tick bites when applied to clothing, but is not effective when applied directly to the skin. Two options are available for Permethrin treatment of clothing worn during field work: 1) pre-treatment of fabric by the clothing manufacturer; or 2) manual treatment of their personal clothing using Permethrin spray in accordance with manufacturers recommendations. This will likely require treatment at home or the office prior to field mobilization. Caution should be used when applying Permethrin as it is highly toxic to fish and house cats. AECOM strongly recommends the first option (employees obtaining pre-treated clothing) to avoid the time required, potential risk, and housekeeping issues involved with manually treating the clothing with spray. Purchase pre-treated clothing in accordance with *S3AM-208-PR1 Personal Protective Equipment* and with the approval of your Supervisor or Manager.
 - The Permethrin pre-treatment is odorless and retains its effectiveness for approximately 25 washings. After 25 washings, the pre-treated clothing will be

considered no longer effective and removed from service. Clothing that has been manually treated by employees will be considered effective for five wash cycles.

- Also, use of clothing that has been pre-treated with Permethrin offers a reduction in the use and application of other insect repellents that shall be applied directly to the skin. Supervisor or Manager approval is required prior to purchase.
- If the employee opts not to utilize chemically pre-treated clothing while potentially exposed to insects, spiders and/or ticks, they shall either: 1) wear Tyvek® coveralls taped to the boots, or 2) wear full-length clothing consisting of long-legged pants and long-sleeved shirts treated with an insect repellent containing Permethrin, DEET, or an oil of lemon eucalyptus to their work clothing.
- Safety Data Sheets (SDS) for the repellents, lotions, and cleansers discussed in this Procedure are not required because the repellents, lotion, and clothing are consumer products used in the manner intended for the general public. Although not required, a SDS should be obtained for the products used and placed into the office SDS library and site-specific safety plan.

4.8 Poisonous Plants

4.8.1 Habitat Avoidance, Elimination and/or Control

- If poisonous plants are identified in the work area, employees will mark the plants using either flags or marking paint, and discuss what the specific indicator will be to signal to other employees to avoid the designated area. If employees decide to use ground-marking paint to identify poisonous plants, they should discuss this tactic with the Manager (and Client as appropriate) for approval.
- If removal of the plants is considered, it should be subcontracted to a professional landscaping service that is capable and experienced in removing the plant. If herbicides are considered for use, a discussion shall need to occur with the Manager (and Client as appropriate) to determine whether it is acceptable to apply herbicides at the work site. Application of herbicides may require a license.
- Employees shall not attempt to physically remove poisonous plants from the work area unless a clearing procedure, including PPE, is prepared in advance and approved by the SH&E Manager. The clearing procedure should be included in the SH&E Plan and THA and the required PPE specified.

4.8.2 Poisonous plants that employees should recognize and take precautions to avoid include: poison sumac, poison ivy (terrestrial and climbing), poison oak, giant hogweed² (or giant cow parsnip), wild parsnip, devil's club and stinging nettle. Many others are extremely poisonous to eat (e.g., poison hemlock; water parsnip) – do not eat anything that has not been identified. Refer to *S3AM-313-ATT5 Plants of Concern* for information on locations where some of these poisonous plants are found in the U.S.

- Of the toxic plants in the cashew family, poison ivy (*Rhus radicans*) is most widespread. It grows in a variety of forms such as a low sprawling shrub, dense ground cover, or a thick woody vine that grows high into the tree canopy. Poison oak (*Rhus diversiloba*) is typically a low shrub in drier soils. Both of these plants have leaves of three and white berries. Poison sumac (*Rhus vernix*) is a tall shrub that is less prolific in distribution. It grows in wet areas, has a compound leaf with a red leaf stem (rachis), and white berries. All of these plants possess urushiol oils in all parts of the plant. Touching the plant causes an itchy skin rash that can show up within 4-72 hours following contact. People have a wide range of reactions including swelling, itching, rash and bumps, patches or blisters.
- Uroshiol oil can also transfer onto clothing and equipment. The oil can remain active on surfaces for up to 5 years and can be transferred to your skin.

² Phytodermatiti producer: keep skin covered and wash well after exposure

- Wild parsnip is found throughout the U.S. and contains a poison that produces a rash similar to poison oak and ivy. Unlike poison oak and ivy, the active oil will not be present on unbroken leaves. See S3AM-313-ATT6 *Wild Parsnip Identification* for additional information and photos of wild parsnip.
 - Several plants in the carrot family contain toxic sap that causes severe dermatitis if it comes into contact with skin that is then exposed to sunlight. The most serious reaction is caused by the giant hogweed (*Heracleum mantegazzianum*), a plant that is spreading in southern Ontario and is also present in southwestern British Columbia. The plant is enormous, attaining up to 16 feet (5 meters) in height, which it does in one growing season. Contact causes painful blistering that can cause permanent disfigurement. It is to be avoided. Similar but less serious reactions can be caused by meadow parsnip (*Pastinaca sativa*) and cow parsnip (*Heracleum lanatum*). Meadow parsnip can be very abundant on disturbed sites.
 - Nettles, particularly stinging nettle (*Urtica dioica*) and wood nettle (*Laportea canadensis*) contain urticating hairs on the leaves and stems that cause sharp pain or itchiness on contact with skin. The irritation is immediate and normally lasts no more than an hour and there are no lasting consequences.
 - Some plants contain abundant stiff spines that can present a safety hazard, particularly if one is to fall into them. These include the cactus (*Opuntia spp.*), devils club (*Oplopanax horridum*), and prickly-ash (*Zanthoxylon americanum*).
- 4.8.3 A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying to not eat any berries or plants if you are unsure of their identity.
- Remember that in the fall and winter the hazard still exists in the form of stubble and roots.
- 4.8.4 Personal Protective Equipment (PPE)
- Employees conducting clearing, grubbing, or similarly disturbing work activities in areas where poisonous plants exist shall wear long-sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. Employees shall not touch exposed skin (neck and face) with potentially contaminated gloves. Tyvek® and gloves worn to protect from exposure to poisonous plants shall be treated as contaminated, removed from the body in a manner that the contamination is not spread, and placed in plastic bags for disposal.
 - Personal clothing that has been exposed to poisonous plants shall be decontaminated with a poisonous plant cleanser such as Tecnu® or removed in a careful manner, bagged and washed separately from other clothing to remove urushiol.
 - Work boots will be decontaminated with either soap and water or a cleansing agent such as Tecnu® cleanser.
 - If foliage is being cleared and includes poisonous plants, exposed skin shall be treated with a dermal barrier cream such as Tecnu®'s Oak 'n Ivy Armor or Enviroderm's Ivy Block and either a full-face respirator or a half-face respirator (with goggles) fitted with a P-100 (HEPA) dust filter.
- 4.9 Bird Droppings and Biological Soil Hazards
- 4.9.1 Work in any area where pigeons or other flying animals (e.g. bats) may nest requires a written statement from the client which states the potential for, and extent of, accumulation of excrement on/in the structure from pigeons or other winged animals.
- 4.9.2 Substantial accumulations of droppings can pose physical and health risks as slippery surfaces (if wet) and if the material is disturbed and becomes airborne, it can be inhaled or ingested if personal hygiene practices are not implemented. Inhalation of airborne droppings can cause diseases such as histoplasmosis. Exposure to surfaces with bird droppings shall be safeguarded by implementing proper work practices, training employees for awareness and using PPE. See S3AM-313-ATT8 *Bird Droppings*.

- 4.9.3 Tularemia is a problem with contaminated soil in some locations. Tularemia is a disease of animals and humans caused by the bacterium *Francisella tularensis*. Rabbits, hares, and rodents are especially susceptible and often die in large numbers during outbreaks. Workers can contract Tularemia through tick and deer fly bites, but also through inhalation of contaminated aerosols or agricultural dusts. Check work areas for carcasses before disturbing the ground (e.g. mowing, brushing, grubbing, excavation, etc.).
- 4.10 Personal Hygiene and Body Checks
- 4.10.1 Tick-borne diseases typically require that the tick be imbedded for four hours to begin disease transfer. The oils from poisonous plants can take up to 4 hours after exposure to penetrate the skin and react with the live proteins under the skin.
- 4.10.2 It is recommended that exposed skin be checked frequently for the presence of ticks, insects, rashes, or discolorations. External clothing should also be checked for the presence of ticks and insects; these should be retained for identification and to determine if medical treatment is needed.
- 4.10.3 Employees shall shower as soon as practical after working in the field and examine their bodies for the presence of ticks, insect bites, rashes, or swollen areas. If imbedded ticks are found, they should be removed using the technique described in *S3AM-313-ATT2 Ticks*.
- 4.11 Employees shall immediately notify their Manager or Supervisor of the presence of an imbedded tick, bee, wasp or hornet sting, other insect bite, rash, or any abnormal reaction. Reporting shall occur within 4 hours for a significant incident and 24 hours for all other SH&E incidents, and in accordance with *S3AM-004-PR Incident Reporting, Notifications & Investigation*.
- 4.12 The Manager or Supervisor shall forward the report to the SH&E Manager for follow up.

5.0 Records

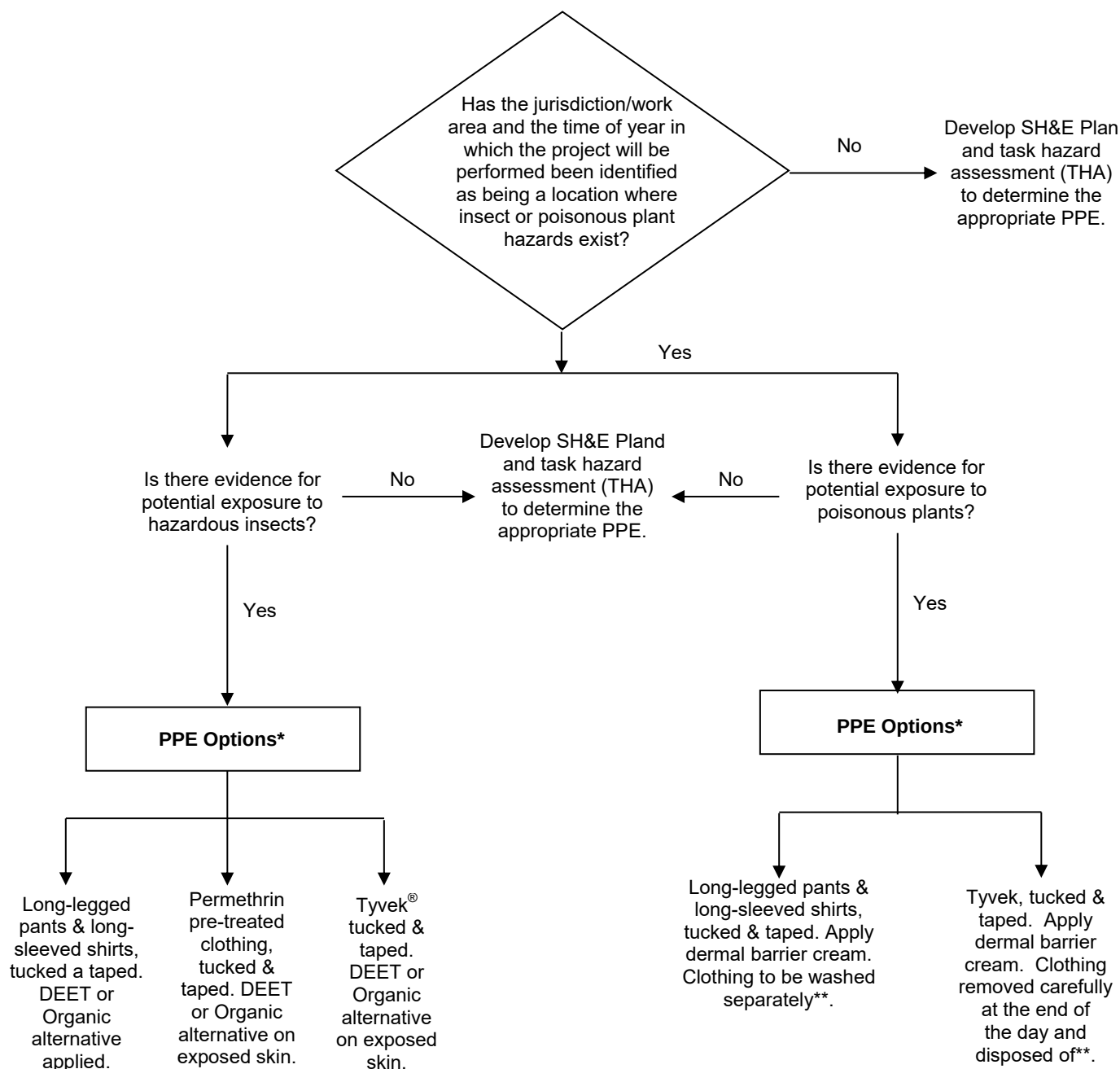
None

6.0 Attachments

- 6.1 [S3AM-313-ATT1 Biological Hazard Assessment Flow Chart](#)
- 6.2 [S3AM-313-ATT2 Ticks](#)
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Biological Hazard Assessment Decision Flowchart

S3AM-313-ATT1



* indicates that when both insect and poisonous plant hazards are recognized hazards at a project site, the most conservative combination of the available PPE choices will be selected. Include the selected PPE option in the respective SH&E Plan and THA.

** indicates that clothing that has been known or suspected to have come in contact with poisonous plants must be washed before it can be worn again. Similarly, Tyvek® that has been known or suspected to have come in contact with poisonous plants will be disposed of rather than reused during a subsequent day or project.

Americas

Ticks

S3AM-313-ATT2

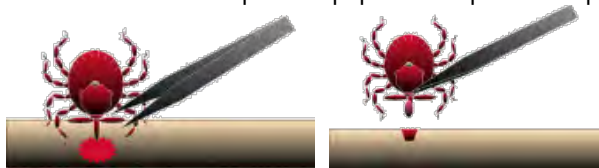
1.0 Background

- 1.1 The Public Health Agency of Canada and the Centers for Disease Control and Prevention work with States and Provinces, health authorities and other experts on research to define and monitor the occurrence of the ticks that carry bacterium that cause disease, including but not limited to:
 - 1.1.1 *Borrelia burgdorferi*, the bacterium that causes Lyme disease.
 - In the United States and Canada, the black-legged tick (*Ixodes scapularis*; often referred to as a deer tick) and the western black-legged tick (*Ixodes pacificus*) are the species known to transmit this disease-causing agent, as well as other less common agents.
 - 1.1.2 *Rickettsia rickettsia*, the bacterium that causes Rocky Mountain Spotted Fever.
 - In the United States and Canada, the American dog tick (*Dermacentor variabilis*), Rocky Mountain wood tick (*Dermacentor andersoni*), and brown dog tick (*Rhipicephalus sanguineus*) are known to transmit this disease-causing agent.
 - 1.1.3 *Francisella tularensis*, the bacterium that causes Tularemia.
 - In the United States, these include the American dog tick (*Dermacentor variabilis*), Rocky Mountain wood tick (*Dermacentor andersoni*), and Lone star tick (*Amblyomma americanum*).
 - 1.1.4 *Ehrlichiosis*, the general name to describe several bacterial diseases that affect animals and humans.
 - In the United States, these include the black-legged tick (*Ixodes scapularis*; often referred to as a deer tick) and the western black-legged tick (*Ixodes pacificus*), and Lone star tick (*Amblyomma americanum*).
- 1.2 Consult local health authorities to determine where tick populations are established or emerging. Locations where distribution may have previously been limited may show evidence of larger populations. Employees working in or adjacent to areas where there are established tick populations may have a greater chance of contact with ticks.
- 1.3 While there is a higher risk of coming in contact with infected ticks in areas where populations are established, there is also a low risk of tick-borne diseases being contracted almost anywhere in the Americas as migratory birds transport infected ticks over large geographic distances. Take precautions to reduce tick contact.
- 1.4 Lyme Disease
 - 1.4.1 The rate of infection of ticks with the bacterium that causes Lyme disease varies. Infection rates are typically higher in adult ticks compared to the other stages (nymphs and larvae).
 - 1.4.2 Despite the lower rates of infection, people are most likely to acquire Lyme disease from a nymph because this stage is so small and thus more likely to go unnoticed and feed for a sufficient amount of time for the Lyme disease bacterium to be transmitted (24-36 hours).
 - 1.4.3 Infection rates are often greater in tick populations that have been established for long periods of time compared to newly established ones.
 - 1.4.4 Lyme disease patients are most likely to have illness onset in April through November with onset peaking in June, July, or August and less likely to have illness onset from December through March

2.0 To Remove Attached Ticks



- 2.1 Use fine-tipped tweezers or notched tick extractor, and protect your fingers with a tissue, paper towel, or latex gloves (see figure). Persons should avoid removing ticks with bare hands.
- 2.2 Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. (If this happens, remove mouthparts with tweezers. Consult your health care provider if illness occurs.)
- 2.3 After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
- 2.4 Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms. Skin accidentally exposed to tick fluids can be disinfected with iodine scrub, rubbing alcohol, or water containing detergents.
- 2.5 Save the tick for identification in case you become ill. This may help your doctor make an accurate diagnosis of potential diseases by determining what type of tick it is. Place the tick in a sealable plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.



3.0 Folklore Remedies Don't Work

- 3.1 Folklore remedies, such as the use of petroleum jelly or hot matches, do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva or regurgitate gut contents, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided.

4.0 Configuration of Clothing

- 4.1 Loose-cuff trousers must be tucked into socks, wrapped with duct tape (or equivalent) completely around the cuff of the sock up on to the surface of the pant leg to prevent entry of insects between the sock and pants, and preferably reverse-wrapped with "sticky" side out (see figure below).



Americas

Poisonous Spider Identification

S3AM-313-ATT3

Black Widow Spider

- Found in warm, dry parts of throughout the United States and extend into the southern edge of Canada.
- Prefer to spin their webs in dark, sheltered spots close to the ground
- Abdomen usually shows hourglass marking.
- The female is 1 to 1.5 inches (3-4 centimeters) in diameter.
- Have been found in well casings and flush-mount covers.
- Not aggressive, but more likely to bite if guarding eggs.
- Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.
- If bitten, see physician as soon as possible.

**Brown Spiders (Recluse)**

- Central and South U.S., although in some other areas, as well.
- 0.25-to 0.5-inch (0.6 to 1.3 centimeters)-long body and the size of silver dollar.
- Hides in decaying wood, baseboards, ceilings, cracks, and undisturbed piles of material.
- Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.
- If bitten, see physician as soon as possible.

**Hobo Spider**

- Primarily found in Washington, Oregon, Wyoming, Colorado, Utah, Montana and the Pacific Northwest United States.
- 0.4-to 0.5-inch (1.1 to 1.3 centimeters)-long body and the size of silver dollar.
- Because of its common features and color, it is easily confused with other spider such as Brown Recluse Spiders.
- They rarely climb vertical surfaces and are uncommon above basements or ground level.
- Bite is initially painless. After 24 hours, the bite develops into a blister and after 24-36 hours, the blister breaks open, leaving an open, oozing ulceration.
- If bitten, see physician as soon as possible.



Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If bitten by a spider, attempt to identify the spider, notify a co-worker or someone who can help should the bite site become painful, discolored, or swollen. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or any swelling or numbness beyond the site of the bite.

Mosquito-Borne Diseases

1.0 Background

- 1.1 Employees working outdoors in the Americas may be exposed to mosquitoes that may transmit illnesses, including Encephalitis and Dengue.
- 1.2 Dengue is transmitted by the bite of a mosquito infected with one of the four dengue virus serotypes. Dengue is endemic to South America.
 - 1.2.1 Dengue is a febrile illness that affects infants, young children and adults with symptoms appearing 3-14 days after the infective bite.
 - 1.2.2 Symptoms range from mild fever, to incapacitating high fever, with severe headache, pain behind the eyes, muscle and joint pain, and rash.
 - 1.2.3 Severe dengue (also known as dengue hemorrhagic fever) is characterized by fever, abdominal pain, persistent vomiting, bleeding and breathing difficulty and is potentially fatal.
- 1.3 West Nile encephalitis is an infection of the brain that is caused by a virus known as the West Nile virus.
 - 1.3.1 Most individuals infected with WNV remain asymptomatic. West Nile (WN) fever is typically a mild illness lasting 3 to 6 days.
 - 1.3.2 The main symptoms are sudden onset of fever with chills, rash, malaise, headache, backache, arthralgia, myalgia and eye pain. Other non-specific symptoms may include nausea, vomiting, anorexia, diarrhoea, rhinorrhoea, sore throat, and cough.
 - 1.3.3 The main route of infection is via the bite of a mosquito that has been infected by feeding on West Nile Virus infected birds.
- 1.4 Arboviral encephalitis is a virus that exists in various forms in global distribution. Numerous forms occur in the Americas, including the following four primary forms that can be transmitted by mosquitoes:
 - 1.4.1 Eastern equine encephalitis (EEE) – United States and Canada
 - 1.4.2 Western equine encephalitis (WEE) – United States
 - 1.4.3 St. Louis encephalitis (SLE) – United States and Canada
 - 1.4.4 La Crosse (LAC) encephalitis.all of which are transmitted by mosquitoes – United States
- 1.5 Mosquitoes are known to breed in standing water; therefore, when standing water is found at a job site, actions should be taken to drain the water. Typically, mosquitoes will fly only a quarter of a mile (400 meters) from their breeding location.
- 1.6 The local Public Health Department and Center for Disease Control and Prevention (CDC) should be consulted to determine what diseases transmitted by mosquitoes are present and exposure prevention recommendations.

Plants of Concern

S3AM-313-ATT5

1.0 Background

- 1.1 Poison ivy, oak and sumac (poisonous plants) pose a significant threat to AECOM employees due to the dermatitis that results from exposure to the oil on these plants, called urushiol.



Poison Oak

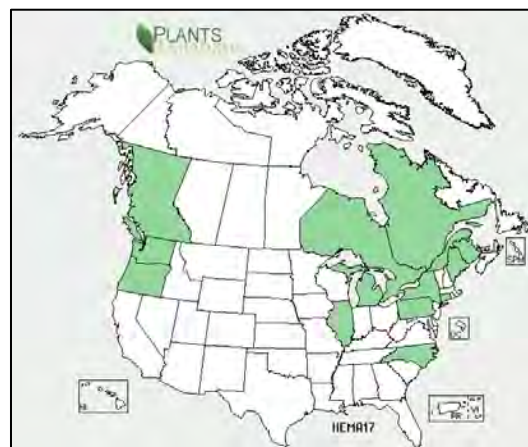
Poison Sumac

Poison Ivy

- 1.2 Exposure to urushiol produces a rash that can be irritating and cause the exposed employee to scratch the infected area, increasing susceptibility for an infection to result from the rash.
- 1.3 It should be noted that each time an employee is exposed to urushiol, it increases the severity of the reaction they will have in subsequent exposures.
- 1.4 Giant Hogweed is a phototoxic plant that causes skin irritation on contact with the sap and, when exposed to sun causes deep blisters.
- 1.5 Blisters from contact with Giant Hogweed can form black or purplish scars that can last for several years. Even a tiny amount of the sap in the eyes can cause temporary to permanent blindness.



Giant Hogweed



Giant Hogweed Distribution

Image obtained from
www.gclandscape.com

2.0 Treatment

- 2.1 In cases that involve severe rashes, medical treatment may be necessary to control the rash.
- 2.2 Employees that develop a rash as a result of exposure to poison ivy, oak or sumac should report the exposure immediately to their Supervisor, Project Manager and Region Safety, Health and Environment Manager.

Pacific Poison Oak Distribution



Image obtained from www.cdc.gov

Atlantic Poison Oak Distribution



Image obtained from www.cdc.gov

Poison Sumac Distribution



Image obtained from www.cdc.gov

Western Poison Ivy Distribution



Image obtained from www.cdc.gov

Eastern Poison Ivy Distribution



Image obtained from www.cdc.gov

Americas

Wild Parsnip Identification

S3AM-313-ATT6

1.0 Background

- 1.1 Wild parsnip (also known as poison parsnip) looks similar to a large carrot plant and is found in open places along roadsides and in waste places throughout the United States and Canada.
- 1.2 This plant produces a compound that causes severe blistering and discoloration after being exposed to sunlight—a condition known as photodermatitis. That is, when the skin comes in contact with this plant's juice and then is exposed to UV light, a severe burn develops.

2.0 Hazard

- 2.1 Everyone can get burned by wild parsnip. Unlike poison ivy, you don't need to be sensitized by a prior exposure. However, wild parsnip is only dangerous when the juice from broken leaves or stems gets on your skin—therefore, you can touch and brush against the undamaged plant without any danger.
- 2.2 If one gets some of the sap of hogweed (or meadow parsnip or cow parsnip) in contact with skin, it is critical that they stay out of the sun for 8 hours. If one needs to remove the plant they should be completely covered with overalls, gloves, hat and safety glasses.



Bird Droppings Safe Work Practices

S3AM-313-ATT8

1.0 Background

- 1.1 According to the National Institute for Occupational Safety and Health (NIOSH), histoplasmosis is an infectious disease caused by inhaling spores of a fungus called *Histoplasma capsulatum* (abbreviated *H. capsulatum*) that may inhabit accumulated masses of pigeon droppings and excrement of other birds and flying animals. Its symptoms vary greatly, but the disease primarily affects the lungs. Occasionally, other organs are affected. This form of the disease is called disseminated histoplasmosis, and it can be fatal if untreated. The acute respiratory disease form of histoplasmosis is characterized by respiratory symptoms, a general ill feeling, fever, chest pains, and a dry or non-productive cough. Distinct patterns may be seen on a chest x-ray. Chronic lung disease resembles tuberculosis and can worsen over months or years. If symptoms occur, they may start within 3 to 17 days of exposure, with an average of 10 days. On a positive note, histoplasmosis is not contagious.
- 1.2 Psittacosis, although primarily a respiratory disease, can cause a wide variety of clinical manifestations. Generally, about 10 days after infection occurs, the clinical illness begins abruptly with fever, chills, weakness, fatigue, muscle pain, anorexia, nausea, vomiting, excessive sweating and difficulty with breathing, headache, backache, and sensitivity to light.
- 1.3 Hypersensitivity pneumonitis is also known as pigeon breeder's disease.

2.0 Symptoms

- 2.1 The acute form of hypersensitivity pneumonitis is clinically characterized by chills, fever, cough, breathlessness without wheezing, and malaise 4-10 hours after exposure. In general, an acute attack subsides after 18 to 24 hours.

3.0 Treatment

- 3.1 If a person should develop any of the symptoms as noted above, or others, it is important to see a physician and inform him of an exposure to pigeon/bird or bat excrement. A failure to diagnose the preceding conditions could occur if a treating physician is unaware of a patient's exposure to pigeon/bird or bat excrement.

4.0 Prevention

- 4.1 Prior to work in any area where pigeons or other flying animals may nest, a written statement from the client shall be obtained in regards to the potential for, and extent of, accumulation of excrement on/in the structure from pigeons and other winged animals.
- 4.2 The client shall be asked to provide appropriate details as to the basis for their statement (e.g., date of last visual survey for pigeon/bird or bat excrement accumulation, date of last excrement removal effort, etc.).
- 4.3 In no case will an AECOM employee or contract employee be permitted to commence structure inspection procedures without the Project Manager having received and evaluated the aforementioned written statement from the client.
- 4.4 According to NIOSH, the best way to prevent exposure to *H. capsulatum* spores during survey and inspection work is to avoid situations where excrement and other potentially contaminated material can become airborne and inhaled. Therefore, it is preferable that the efforts to determine if, and to what extent, there is an accumulation of pigeon/bird or bat excrement on/in structures, or the efforts to clean-up/remove/dispose of such contaminated material, be left to the client or subcontracted out.

5.0 Safe Work Practices

- 5.1 In those cases where AECOM employees or contract employees are contracted by the client to determine the extent of accumulation of animal excrement in/on structures, the following minimum safety and health precautions shall be taken. (NOTE: precautionary measures are based on recommendations and best practices prescribed in the NIOSH 2004 public document titled *Histoplasmosis – Protecting Workers at Risk*).
- 5.2 All workers shall wear disposable protective clothing (Tyvek® coveralls). Disposable overalls with hoods shall be donned when working in areas where *H. capsulatum* spore-contaminated material is likely to fall from overhead.
- 5.3 All workers shall wear disposable shoe coverings fitted with ridged soles made of slip-resistant material to reduce the likelihood of slipping on wet or dusty surfaces. Gloves shall be worn.
- 5.4 All workers shall wear a full facepiece air purifying respirator fitted with P100 (HEPA) cartridges. If entering an enclosed area in which the extent of excrement contamination is unknown, additional protective measures shall be taken such that workers shall wear a powered air-purifying respirator (APR) with full facepiece fitted with P100 (HEPA) cartridges. Any variance from these requirements must be approved by the Region Safety, Health and Environment Manager. Workers donning APRs shall be medically screened, cleared, and trained in their proper use in accordance with AECOM safety program standards.
- 5.5 If contaminated material must be disturbed for purposes of removal/disposal or during the structure inspect process, it shall be wetted down prior to all work and will be rewetted as necessary to minimize airborne dusting.
- 5.6 After working in *H. capsulatum* spore-contaminated areas and before removing any respiratory protective equipment, workers shall remove all protective clothing and shoe coverings and seal them in a heavy-duty plastic bag for disposal.
- 5.7 Workers shall observe a high degree of personal hygiene, even if the exposure is casual. Special care shall be taken to wash hands, face, and other areas of exposed skin thoroughly before eating, drinking or smoking.

Americas

Large Carnivores & Ungulates

S3AM-313-ATT9

1.0 Hazard

- 1.1 Most wild carnivores in the feline family (cougars, lynx, and bobcat) or the canine family (wolves and coyotes) are more predictable than bears and are not predatory towards humans; however, all wild animals can be dangerous if they feel threatened or if they are sick or starving.
- 1.2 Most ungulates (deer, moose, elk, and caribou) will avoid humans and will flee as soon as a human is sighted; however, females with young (during May and June) and males during the mating season (September to November) can be very aggressive, especially if provoked.

2.0 Personal Protective Equipment

- 2.1 Noise makers such as bear bangers, whistles and bells can be used as deterrents for an approaching animal.
- 2.2 Pepper (bear) spray can be used to ward off an imminent attack.

3.0 Safe Work Practice

- 3.1 Most negative encounters with ungulates or carnivores can be avoided with a few key preventative measures:
 - 3.1.1 When working in wilderness isolation, always travel in pairs and make lots of noise.
 - 3.1.2 Always store food in air-tight containers away from sleeping areas (if camping) and never carry strong smelling foods which could attract animals.
 - 3.1.3 Keep your eyes open for fresh animal signs which may indicate a dangerous situation:
 - Extensive fresh rubbing on branches in the fall might indicate the presence of a rutting male ungulate that may become aggressive to defend a potential mate.
 - A fresh kill or carcass which might indicate the presence of a carnivore that may become aggressive to defend its food.
- 3.2 Maintaining a distance of at least 100 feet (30 meters) allows large animals an escape route. If you notice any signs of aggression or behavioral changes, you should move away to a safe location. Wildlife should not be enticed by reaching out or simulating calls.
- 3.3 Pets should be kept secure and away from wildlife as their actions can provoke an attack. Moose, deer and other wildlife may appear quite docile; however, if a dog makes them feel threatened, their behavior can become unpredictable.
- 3.4 **If you are approached by a carnivore (wolf, coyote, or cougar):**
 - 3.4.1 Pick up small children immediately.
 - 3.4.2 Try to appear bigger, hold your arms or an object over your head.
 - 3.4.3 Face the animal and retreat slowly. Do not run or play dead.
 - 3.4.4 Maintain steady eye contact with the animal.
 - 3.4.5 If the animal continues to approach, deter an attack by yelling, waving a stick or throwing rocks.
 - 3.4.6 If you are attacked, fight back. Hit the animal with a heavy stick or rock.
- 3.5 **If you are approached by an ungulate (moose, elk, deer, bison or caribou):**
 - 3.5.1 An angry moose, elk or deer will face you with its head and ears lowered.

- 3.5.2 Back away slowly.
- 3.5.3 Look for something to get behind like a tree or a car. You can go faster around an obstacle than the ungulate can.
- 3.5.4 An ungulate is more likely to bluff charge but if it continues the charge and you are attacked in the open, curl up in a ball on the ground. Always protect your head with your arms and lie still.
- 3.5.5 Stay still after the attack until the ungulate moves away.

Bear Safety

S3AM-313-ATT10

1.0 Hazard

- 1.1 An encounter with a bear of any species can have a wide variety of outcomes, ranging from a simple sighting, to a false charge, to a serious mauling or even death. Consequently, the risk of a bear encounter must be taken very seriously.
- 1.2 The hazard or risk associated with a bear encounter varies significantly depending on the location. It is important to research the project area before field work commences to determine the expected probability of encountering a bear. Remoteness from urbanized areas should not be a criterion, as bears have been encountered within city limits, especially near landfills.
- 1.3 The risk associated with a bear encounter also varies with the species of bear, the season, and the circumstances under which the bear is encountered.
- 1.4 Preparing staff for any type of encounter is key to managing the risk.

2.0 Personal Protective Equipment

- 2.1 The best deterrent of a “bad bear encounter” is knowledge: a good understanding of the ecology and the behavior of the bears that will likely be encountered.
- 2.2 Bear Spray and Bear Bangers
 - 2.2.1 Staff must have hands-on training for the safe use of bear spray (a pre-season practice run is a good use of expired bear spray).
 - 2.2.2 Prior to work commencing, staff must ensure that the bear spray they are carrying is still valid and not past its expiration date.
 - 2.2.3 During travel, bear spray must be sealed in an airtight container or bag and must not travel in the cab of a vehicle, aircraft, or helicopter.
- 2.3 Firearms
 - 2.3.1 Environments and conditions which pose a high risk of bear encounters, may warrant the use of an armed wildlife monitor. Project managers, in consultation with appropriate project staff and Safety, Health and Environment Management, are responsible for determining the level of risk for their projects and whether or not such measures are required.
 - 2.3.2 A person hired as an armed bear monitor must be properly trained in wildlife monitoring as well as certified in the expert usage of firearms.
 - 2.3.3 The usage of an armed bear monitor is intended only as an additional precautionary measure to be used in specific environments to ensure the protection of field staff; staff should still be equipped and trained appropriately for the risk.

3.0 Restrictions

- 3.1 Staff must not work alone in areas where there is a medium or high risk of a bear encounter.
- 3.2 AECOM personnel shall not carry firearms or attempt to function as a wildlife monitor and/or perform their professional duties. For possible exceptions contact the Regional SH&E Manager who will evaluate the potential hazards with Regional Manager and Legal and provide written response. This can only be overridden with expressed permission of Region Executive and AECOM Chief Resilience Officer, refer to *WP-001-PR Firearms Standard*.

4.0 Training

- 4.1 In-house Bear Awareness training must be taken by all field staff who work in bear country every three years at a minimum, or more often as required.
- 4.2 The Bear Awareness training involves testing and improving the employee's knowledge about bear encounters, watching videos regarding bear awareness and behavior, and participating in group discussions about how to avoid and how to respond to bear encounters.
- 4.3 Specific considerations are given to black bear, grizzly bear, and polar bear encounters.

5.0 Safe Work Practice

- 5.1 Staff must be aware of wildlife signs and avoid wildlife encounters.
- 5.2 Bear Signs
 - 5.2.1 Fresh tracks – It is often better to see the bear's tracks than to see the actual bear. If you can tell the direction that the bear is travelling in, it is prudent to change your course of direction. Bears will travel down the same pathways people or other large animals use. If you have a clear track you can determine which type of bear has passed through the area. If you see more than one track, you can tell that it is possibly a female with cubs. Avoid females with cubs!
 - 5.2.2 Scat – Bear scat will look different depending upon the bear's diet. Close examination of bear scat can sometimes give you an indication of what the bears have been eating at that time of year. If the scat contains remnants of human garbage, there is a human food conditioned bear in the area. These bears associate people with food and can be the most dangerous type of bear to encounter.
 - 5.2.3 Animal carcasses – IF YOU COME ACROSS A CARCASS, LEAVE THE AREA IMMEDIATELY. Grizzly bears will often cover their kills for a few days and let it rot, then come back and eat it. THE BEAR WILL STAY CLOSE BY. Grizzly bears will defend their kill and this is a situation that could prompt a defensive attack by a bear.
 - 5.2.4 Torn-up logs and stumps – Bears will forage for insects in dead logs and rotting trees. You will often see torn up logs and stumps, evidence of their foraging.
 - 5.2.5 Evidence of digging – Holes dug into the ground are often made by grizzly bears digging for roots or ground squirrels. In particular, grizzlies will dig for food in the early spring soon after they leave their dens.
 - 5.2.6 Claw marks on trees – Claw marks can be left on trees by black bears when they have climbed up a tree. Grizzly bears will also leave claw marks on trees and on the ground. Bears will often chew a small tree or a sign-post, so watch for signs of chew marks along the trail.
 - 5.2.7 Hair on trees – Bears will rub against trees, usually trees with rough bark, to scratch themselves. You can find evidence of bears by the hair left in the tree's bark. The higher the hair left on the tree, the bigger the bear. Remember that the bear will often stand on its back legs to scratch its back on the tree.
 - 5.2.8 Daybeds – Bears will be most active in the early morning and in the evening. It would be prudent for field staff to restrict their field activities during the bear's most active foraging times as much as possible. During the heat of the day, bears will rest in daybeds. These can be shallow depressions of piled up leaves in the forest, trampled vegetation, a shallow scrape or a hole. Daybeds are usually located in cool places. Bears will make daybeds along streams and rivers. Daybeds are often associated with feeding places and therefore should be avoided.

5.3 Prevention

5.3.1 Your best defense against bears is to actively practice bear avoidance techniques when working in the field. You can prevent chance encounters by taking the following precautions:

- Know the areas and habitats bears use at different times of the year, and attempt to avoid such areas or be extremely cautious if you have to travel through them.
- Contact the local Fish & Wildlife Office to get current information on the bears in the area. Ask what other camps are in the area and if they are following good bear avoidance practices. (i.e., do they keep a clean camp?) If there are nearby human food sources available, e.g., an open dumpsite, the local bears may not be afraid to approach your camp.
- Always be aware of your surroundings. Stay alert. Watch for signs of bears along your route.
- Use binoculars to look around for bears when you are in open terrain.
- Never approach a bear if you see one feeding in the distance.
- Note the behavior of other wildlife in the area. Flocks of ravens can alert you to a possible animal carcass, and perhaps a bear. The area should be avoided. Bird or squirrel alarm calls might be telling you that a bear is near.
- Whenever possible, travel in daylight and try to avoid areas with restricted visibility, e.g., dense brush.
- Make lots of noise, especially when travelling in dense vegetation. Sing, shout, or talk loudly. You can carry portable air horns or cans of rocks. (Please note that bear bells are not effective – they do not make enough noise to warn a bear that you are approaching. You need to be loud so the bear can hear you coming.) Remember that the noise you make can be masked by loud natural sounds such as the wind or water. Therefore it is possible that the noise you make can go unnoticed by a bear whose attention is focused on feeding. You must make every attempt not to surprise a bear. In areas of loud natural noise, be louder!
- Stay together and travel in groups. Bears are less likely to attack groups of people. When travelling in groups, stay close together. Being in a group doesn't help if the individuals have spread apart along the trail.
- Pets should not accompany you when you are travelling in bear country. If you must take your pet, keep the animal on a short leash at all times. Unleashed dogs will harass bears and once scared, run back to their owner with an angry bear in pursuit.
- Do not wear perfumes or cosmetic products when you are travelling in bear country. Do not mask your human scent.
- All sanitary products should be stored in a similar fashion as food (stored at least 10 feet [3 meters] above site).
- Children should be kept very close by in bear country.
- Carry bear deterrents and know their limitations. Be familiar with how to use the deterrents, how to transport the deterrent safely and under what conditions it is most effective. Carry the deterrent in a belt, out in front and ready to grab at a moment's notice, never in your backpack.

5.4 Field Worker Precautions in Bear Country

5.4.1 Field workers should take extra precautions when working in bear country:

- Make every effort to go out into the field with another person; you should not be working alone in the field. One person can act as a lookout for the other. Keep watch for bear signs.
- Never approach a bear.
- Report where you are going and when you will return every time you leave camp. Have a plan of action if someone does not report back to camp at a specified time.

- Bears do get used to a camp's schedule and you will have fewer surprise encounters if everyone in the camp comes and goes at the same time every day.
- Take a two-way radio with you when you go out into the field.
- Always carry bear deterrents with you in the field and understand each deterrent's limitations. Carry your deterrents on a belt, out in front and ready to use instantly. Do not carry your deterrents in your backpack.
- Keep any food that you take with you sealed in odor-proof/bear-proof containers. Make every attempt to take odorless food with you, not something with a heavy scent.
- Pack out any garbage in odor-proof containers and burn once you return to camp.
- The noise of an ATV or skidoo can scare off a bear. Starting the machine and revving it up can scare off a curious bear. DO NOT CHASE A BEAR WITH AN ATV OR SKIDOO. You may need to drive the ATV around in circles to scare off the bear, but do not chase the bear.
- Take extra precautions when travelling along lakes or stream beds; bears use streams and river beds as travel routes. Be sure to carry noise makers.
- Limit your workday so you are not out in the early morning or evening when bears are most likely to be foraging.
- All **employees** should be proficient in First Aid. Do not go out into the field without first aid training.
- All field camps should have a First Aid Kit.
- All field camps should have means of communication with local ambulance or air ambulance personnel.
- A person's best defense against bears is to avoid them. If this is not possible, then being heard, smelled, or seen may lessen your chances of surprising a bear and/or provoking an attack.
- All wildlife should be respected, avoided, and not harassed at any time.
- Cooking in remote areas should be avoided. Any food should be stored in airtight containers and all garbage should be managed appropriately: "pack it in, pack it out".
- A bear in camp or within human structures is not a chance encounter. If this bear challenges you, you must fight, scream, and do whatever is necessary to live, no matter what species the bear is!
- In general, there are two types of bear encounters: Defensive and Non-defensive for grizzly bears and black bears. Your response will vary based on your assessment of the situation (your training will help you in identifying these situations and the appropriate response).

6.0 Encounters

6.1 General Recommendations When Encountering a Bear

- Consider your surroundings and assess the situation before you act.
- Remain calm. Do not turn your back to a bear.
- DO NOT RUN – Running may trigger the bear's natural pursuit response. Bears are able to reach speeds of 25 miles per hour [40 kilometers per hour], must faster than Olympic sprinters. Bears are also excellent swimmers.

6.2 Bear Encounters in the Field

- 6.2.1 Your response will depend upon the type of encounter.

- 6.2.2 Bears are more predictable than once believed and you can determine your best course of action in a confrontation by understanding the bear's characteristics and motivation. There are two pieces of information you should be aware of in any bear encounter:
 - The type of bear you are dealing with, and
 - The reason for the encounter.
- 6.2.3 Some people believe that when you stand your ground against a predatory black bear attack, the bear will feel threatened and leave. This has been effective in some cases. HOWEVER, it is not effective against a grizzly bear predatory attack and it is very difficult to know when it will be effective against black bears. Polar bears do not follow the same behavioral patterns as grizzly and black bears; polar bears are almost always aggressive and will not back down. Special considerations must be given to projects where polar bear encounters are anticipated.
- 6.3 If you can leave undetected:
 - 6.3.1 Leave the area quietly in the same direction that you came from.
 - 6.3.2 Move while the bear's head is down. Stop moving when the bear lifts its head to check its surroundings.
 - 6.3.3 Stay downwind so the bear will not pick up your scent.
 - 6.3.4 When you have moved a safe distance away, you can either watch and wait until the bear leaves or make a wide detour around the bear.
 - 6.3.5 If the bear is unaware of you and approaching, allow the bear the right of way.
- 6.4 If you cannot leave undetected:
 - 6.4.1 Let the bear know that you are present by smell first; therefore move upwind so they can pick up your scent.
 - 6.4.2 If it is possible, try to keep the bear in your sight. Watch to see if the bear leaves when it smells that a person is nearby.
 - 6.4.3 Attempt to move out of the way without being noticed by the bear. If you cannot do this, talk loudly to let the bear know where you are.
- 6.5 If the bear is aware of you but in the distance:
 - Remain calm.
 - Continue walking slowly in the same general direction, but head away from the bear.
 - DO NOT RUN.
 - If the bear begins to follow you, drop your pack or some article, (not food) to distract the bear. This may distract the bear long enough for you to escape. If you drop food for the bear – you will help the bear associate food with humans and teach it that aggressive behaviour will be rewarded with food.
 - If it is a grizzly following you, climb a tree if there is a large tree around. Proper escape up a tree would require scrambling at least 33 feet (10 m), however this is applicable only to Grizzly encounters. Black bears are excellent climbers. Tree climbing should be last resort.
- 6.6 If the bear is aware of you and close:
 - A bear will feel threatened in a close confrontation. The bear's natural tendency will be to reduce or to remove the threat. Assist the bear by acting as non-threatening as possible.
 - Do not make direct eye contact with the bear.
 - Do not make any sudden moves.
 - Do not run!

- The bear needs to identify you as a person, so talk in low tones and slowly wave your arms over your head.
- Attempt to give the bear an opportunity to leave. Be sure the bear has an open escape route. Do not corner a wild animal.
- Try to back away slowly and/or climb a tree if appropriate.
- Attempt to deter the bear if you are in a safe position.

6.7 If the bear is close and threatening:

- If you have a deterrent such as a bear banger or bear spray, be prepared to use it depending on how close the bear is. Try to scare the bear off.
- If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.
- Talk to the bear in a calm authoritative tone of voice.
- Do not startle or provoke the bear by making sudden moves.
- Never imitate the bear's aggressive sounds, signals or posture. The bear is attempting to establish dominance and imitating its moves is a challenge to its dominance.
- Back slowly away from the bear and drop a pack or some other article in order to distract the bear momentarily.
- Remember that the bear may be defending cubs that you have not yet seen or they have a food cache nearby. Attempt to look as non-threatening as possible.

6.8 If the bear is very close and approaching:

- A distance of less than 164 feet (50 meters) in an open area and closer in a forested area.
- If the bear continues to approach, use your deterrent.
- If the bear does not respond to the deterrent you must now **STAND YOUR GROUND!**
- If the bear continues to approach and is acting aggressive, **YOU MAY HAVE TO SHOOT** if you are carrying a firearm.

6.9 If the Bear Charges:

- A bear will charge you at high speed down on all four legs and often crouched low to the ground.
- Bears do not charge when standing up on the hind legs.
- Many charges are bluffs and the bear will often stop or veer off just at the last minute. It is difficult to know if the bear is bluff charging or not until it gets very close.
- When faced with a charging bear you have two options:
 - Use your bear deterrent; or
 - Roll into a ball and cover your neck and head with your arms if you are unarmed and have no other choice.

Small Mammals

S3AM-313-ATT11

1.0 Hazard

- 1.1 Working in the field either directly or indirectly with small mammals has inherent risks of injury or exposure to zoonotic diseases (infectious diseases that can be transmitted from animals to humans) that all field staff need to protect themselves against.
- 1.2 The risks are usually higher when there is direct contact with a wild animal, either through a break in the skin (blood), saliva, or excrement; however, there are also risks through air-borne diseases (e.g., Hantavirus).
- 1.3 Obviously, wildlife biologists directly handling wildlife, dead or alive, or working with wildlife feces or in enclosed habitats (such as caves), have an increased risk of exposure to a wider range of zoonotic diseases and should take extra precautions.

2.0 Personal Protective Equipment

- 2.1 Full-length clothing (long sleeves and pants)
- 2.2 Insect repellent
- 2.3 Respiratory equipment (when directly handling wildlife)
- 2.4 Gloves (when directly handling wildlife)

3.0 References

- 3.1 None.

4.0 Restrictions

- 4.1 Wildlife handling must only be completed under direct supervision of an experienced individual.

5.0 Training

- 5.1 Any staff that will be handling wildlife must be adequately trained and/or supervised by a wildlife biologist experienced in the job task.

6.0 Safe Work Practice

- 6.1 Wild animals can carry a variety of diseases that humans can contract: viral, parasitic, bacterial, and protozoal. Basic Personal Protective Equipment such as full-length clothing, gloves and a respiratory mask will greatly reduce the risk of exposure.
- 6.2 Treat unknown dogs encountered in field activities in the same manner as a wild animal. Be conscious of behaviors that seem to indicate anxiety (tail under the belly), defensiveness or aggressiveness, and attempt to leave the area if these are identified.
- 6.3 Whenever a wild animal must be handled, the procedure must be accomplished as safely and quickly as possible.
- 6.4 Proper techniques must be employed to avoid or minimize the risk of personal injury while, at the same time, avoiding or minimizing injury to the animal.
- 6.5 Gloves, catch sticks, caging, and other appropriate equipment may be necessary when handling a wild animal. Most of these animals will be extremely stressed, resisting every restraint attempt.

- 6.6 In the unfortunate circumstance that a person is bitten or scratched, he or she should cleanse the wound thoroughly with soap and flush with water immediately, providing for a mechanical removal of potentially infective organisms. This should be followed by cleansing under medical supervision and consultation with a physician to consider the potential exposure to the rabies virus.

7.0 Rabies

- 7.1 You will not be able to accurately determine if an animal has rabies simply by observation as traditional symptoms of rabies (foaming at the mouth, biting, etc.) do not occur in all animals nor at all stages. There are some mammals that are at a higher risk than others for the rabies virus, such as raccoons, skunks, stray cats and dogs, foxes, coyotes, rodents, and bats; however, any mammal can contract the virus.
- 7.2 Rabies is contracted by contact of an infected animal's saliva with an open wound – a bite or a scratch.
- 7.3 Symptoms of rabies in humans usually do not present themselves for a minimum of 10 days to a year or longer (the average is 30 to 50 days). Symptoms are typical of a flu, including malaise, loss of appetite, fatigue, headache, and fever. Over half of all patients have pain (sometimes itching) or numbness at the site of exposure. They may complain of insomnia or depression. Two to ten days later, signs of nervous system damage appear; these include hyperactivity and hypersensitivity, disorientation, hallucinations, seizures, and paralysis.
- 7.4 Because rabies is so difficult to detect and positively identify, it is very important to consult a physician immediately. If rabies is a possibility, begin treatment with the rabies vaccine as soon as possible (unlike other vaccines, rabies vaccination begins after exposure because the virus takes a comparatively long time to induce disease).

8.0 Hantavirus

- 8.1 Rodents can carry a variety of diseases; of notable concern is the North American hantavirus which can cause Hantavirus Pulmonary Syndrome (HPS).
- 8.2 A common host of the hantavirus is deer mouse and related species (*Peromyscus* spp.), which are common throughout much of North America.
- 8.3 Although infection is rare, it can be fatal and, therefore, it is necessary that risk of exposure be minimized. Infection can be spread to humans when they:
 - 8.3.1 Breathe air contaminated by deer mouse saliva, urine or feces containing infectious hantaviruses; or
 - 8.3.2 Accidentally rub eyes, mouth or broken skin with hantavirus-infected deer mouse saliva, urine or feces.
- 8.4 The following precautions will be taken for all field operations:
 - 8.4.1 Limit exposure to soils handling and use gloves where appropriate.
 - 8.4.2 Wash or sanitize hands often throughout the day and before meals.
 - 8.4.3 Equipment bags, storage areas, and vehicles will be inspected daily for signs of deer mouse infestation.
 - 8.4.4 Rodent-proof storage containers will be used when practical.
 - 8.4.5 Do not enter buildings infested with deer mice without adequate respiratory protection.
 - 8.4.6 Droppings should never be removed by vacuuming or sweeping. Wetting down an area with a mixture of 1:9 household bleach and water solution will reduce risk of airborne exposure.
- 8.5 If flu-like symptoms develop three days to six weeks after exposure to rodents, a doctor should be contacted immediately (mechanical ventilation is the primary method of treatment).

9.0 Bubonic Plague

- 9.1 The bacteria that cause plague, *Yersinia pestis*, maintain their existence in a cycle involving rodents and their fleas.
- 9.1.1 In urban areas or places with dense rat infestations, the plague bacteria can cycle between rats and their fleas.
- 9.1.2 Humans may contract the plague bacteria through:
- Infected flea bites.
 - Contact with contaminated fluid or tissue of a plague infected animal.
 - Infectious droplets from an infected person coughing into the air (very uncommon in the United States, but relatively frequent in developing countries).
- 9.1.3 Individuals infected develop sudden onset of fever, headache, chills, and weakness and one or more swollen, tender and painful lymph nodes (called buboes).
- 9.1.4 Immediate medical attention is necessary to prevent complications or death.
- 9.1.5 Rodent control measures should be employed at AECOM locations.
- 9.1.6 Wear gloves if handling potentially infected animals to prevent contact between skin and the plague bacteria. Contact the local health department with and questions about disposal of dead animals.
- 9.1.7 Repellent shall be used if there is potential exposure to rodent fleas. Products containing DEET can be applied to the skin as well as clothing and products containing permethrin can be applied to clothing (always follow instructions on the label).

Snakes & Scorpions

S3AM-313-ATT12

1.0 Hazard

- 1.1 Snakes have the ability to inject venom. A bite from a venomous snake, which may inject varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency.

2.0 Personal Protective Equipment

- 2.1 Long pants and shirts
- 2.2 Heavy gloves if staff will be handling debris or be close to the ground
- 2.3 Rubber boots, or boots that fully cover the foot (not sandals!) and preferably are at least 10 inches (25 centimeters) high
- 2.4 Snake Chaps that cover at least the shin
- 2.5 Personal first aid kit

3.0 Restrictions

- 3.1 Staff must not work alone in areas where the risk of a snake encounter is high.

4.0 Safe Work Practice

- 4.1 Prior to going into the field, staff should research the area and identify what species are present. Once confirmed, staff should contact local hospitals to identify which carry anti-venom and include that information into the SH&E Plan and THA.
- 4.2 Staff working in areas known to be inhabited by venomous snakes should take extra precautions, be able to identify the local snake species, and understand the best practices for administering first aid.
- 4.3 Most snakes in Canada are non-venomous; and most snake bites are not fatal, only painful. Learning to identify snake species will assist you in responding appropriately to an encounter, and will assist medical professionals in determining if antivenin needs to be administered if anyone is bit.
- 4.4 Most snakes are non-aggressive and will only attack if immediately threatened.
- 4.5 Prevention
 - 4.5.1 Before venturing out into the wilderness, familiarize yourself with the snakes in your area, both venomous and non-venomous species.
 - 4.5.2 Learn which habitats the venomous species in your region are likely to be encountered in, and use caution when in those habitats.
 - 4.5.3 Try as much as possible not to take a snake by surprise.
 - 4.5.4 Stay on trails where possible, and watch where you place your hands and feet, especially when climbing or stepping over fences, large rocks, and logs, or when collecting firewood. Take care when overturning any objects on the ground when in snake country.
 - 4.5.5 If you see a snake, give it as much room as possible. Most snakes have a strike distance that is only half the length of their body.
 - 4.5.6 If you get very close to a rattlesnake, hold very still until it calms down and starts to move away. Then slowly move backwards until you are at least one snake-body length away.

4.6 Treatment

- 4.6.1 A bite from a venomous snake should be considered a major medical emergency. Emergency services should be contacted immediately and staff should follow the direction of the medical responders.
- 4.6.2 Try to keep the snakebite victim still, as movement helps the venom spread through the body.
- 4.6.3 Keep the injured body part motionless and just below heart level.
- 4.6.4 Keep the victim warm, calm, and at rest, and transport him or her immediately to medical care.
- 4.6.5 Do not allow him to eat or drink anything.
- 4.6.6 If medical care is more than half an hour away, wrap a bandage a few inches above the bite, keeping it loose enough to enable blood flow (you should be able to fit a finger beneath it). Do not cut off blood flow with a tight tourniquet. Leave the bandage in place until reaching medical care.
- 4.6.7 Identify the snake that caused the bite to determine if it is venomous, and if antivenin needs to be administered. Do not waste time or endanger yourself trying to capture or kill it. Note the shape and color of the snake's head.
- 4.6.8 If you are alone and on foot, start walking slowly toward help, exerting the injured area as little as possible.
 - Note that there are several species of snakes that superficially resemble rattlesnakes. Several species, including Bull, Milk, Fox, and Rat Snakes will even rattle their tails when startled.
 - Massasauga Rattlesnake is recognized as a Threatened Species in Ontario and it is an offence to harass, or destroy the habitat of this species.
- 4.6.9 Workers in scorpion habitat have the potential to be stung.
 - Scorpions usually hide during the day and are active at night. They may be hiding under rocks, wood, or anything else lying on the ground. Some species may also burrow into the ground. Most scorpions live in dry, desert areas. However, some species can be found in grasslands, forests, and inside caves.
 - Scorpions are found in Southern and Southwestern United States.
 - One scorpion species, the Northern Scorpion (*Paruroctonus boreus*) occurs in semi-arid areas of southern British Columbia, Alberta, and Saskatchewan. It carries a stinger on the end of its tail. The sting is painful but not life threatening unless there is an allergic reaction.
 - Workers should wear long sleeves and pants. Clothing and shoes should be shaken out before put on.
 - Symptoms of a scorpion sting may include:
 - A stinging or burning sensation at the injection site (very little swelling or inflammation)
 - Convulsions
 - Staggering gait
 - Slurred speech
 - Drooling
 - Muscle twitches
 - Abdominal pain and cramps
 - Scorpion stings may be painful, but most are harmless. In the United States, only the Bark Scorpion has venom that can potentially cause severe symptoms.
 - Scorpions capable of lethal stings are found predominantly in Mexico and South America.
 - If there is any question as to what type of scorpion caused the sting, contact medical services immediately.

5.0 Species

5.1 Venomous Snakes in Canada

Eastern Massasauga Rattlesnake (<i>Sistrurus catenatus</i>) found around Wainfleet, Windsor, Bruce Peninsula and eastern Georgian Bay in Ontario.	 Eastern Massasauga Rattlesnake picture by Michael Redmer/Courtesy Lincoln Park Zoo
Northern Pacific Rattlesnake (<i>Crotalus viridis</i>) found primarily in Okanagan and Thompson River valleys of southern British Columbia.	 LANCE TANNAHILL 2000
Prairie Rattlesnake (<i>Crotalus viridis</i>) found in south eastern Alberta, and south western Saskatchewan.	

5.2 Venomous snakes in the United States

Rattlesnake(<i>Crotalus cerastes</i>) found mostly concentrated in the southwestern United States, they extend north, east and south in diminishing numbers and varieties. Every contiguous state has one or more varieties of rattlesnake. The rattlesnake is found in many different biomes ranging from along the coast at sea level, the inland prairies and desert areas to the mountains at elevations of more than 10,000 feet. Species include: Sidewinder, Santa Catalina, Western,	 Western Rattlesnake

Mojave, Red Diamond, Western Diamond, Ridge Nosed, Eastern Diamondback, and Pigmy.	 Eastern Diamondback
Copperhead (<i>Agkistrodon contortrix</i>) is the most common venomous snake found in the eastern United States. It can be found in the states of Texas, Oklahoma, Kansas, Missouri, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, Tennessee, Kentucky, Virginia, Illinois, Indiana, Ohio, Iowa, Pennsylvania, Maryland, New Jersey, Delaware, New York, Connecticut, and Massachusetts.	
Cottonmouths (water moccasins) (<i>Agkistrodon piscivorus</i>) found in the eastern United States from Virginia, south through the Florida peninsula and west to Arkansas, eastern and southern Oklahoma, and east and central Texas.	
Coral Snake (<i>Micrurus sp.</i>) found in the southern range of many temperate United States including North Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, Arkansas, Kentucky, Arizona, and New Mexico.	 Eastern Coral Snake, <i>Micrurus fulvius</i>

Working On & Near Water

S3AM-315-PR1

1.0 Purpose and Scope

- 1.1 Establishes the minimum requirements and guidance for AECOM personnel assigned to projects that place them at risk of falling into water where a drowning hazard exists (e.g., more than 3 feet / 1 meter deep, fast-moving stream, water body with soft bottom creating entrapment hazard), including working ashore, near to, or over water or ice.
- 1.2 Employees performing tasks involving work on or under bridges, or on larger vessels, barges, or boats, who are constantly protected by guardrail systems, nets, or body harness systems are deemed to be adequately protected from the danger of drowning, and are not required to wear life jackets or buoyant work vests.
- 1.3 Projects conducted on a ship at sea or in port may not be required to comply with parts of this procedure provided:
 - AECOM can demonstrate the hazard and related controls as identified in this procedure are adequately addressed through controls established by another controlling entity (e.g. ship owner/operator, port authority, etc.) and these are available to AECOM personnel.
 - If AECOM cannot demonstrate adequate controls are in place, the related requirements of this procedure shall be met.
- 1.4 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

- 2.1 **PFD** – Personal Flotation Device
- 2.2 **Life Jacket** – A personal flotation device that will turn over an unconscious worker in the water so their face and nose are not submerged.
- 2.3 **USCG** – United States Coast Guard
- 2.4 **Lifebuoy** – A throwable buoyant rescue ring with 90 feet (28 meters) buoyant line attached.

3.0 References

- 3.1 S3AM-003-PR1 SH&E Training
- 3.2 S3AM-208-PR1 Personal Protective Equipment
- 3.3 S3AM-209-PR1 Risk Assessment & Management
- 3.4 S3AM-333-PR1 Marine Safety & Vessel Operations
- 3.5 S3AM-334-PR1 Diving

4.0 Procedure

- 4.1 Roles and Responsibilities

4.1.1 Manager

Responsible for the overall success of a project and the performance of employees engaged in project activities (with the support of Supervisors), and as follows:

- Confirm that all appropriate Safety, Health and Environment (SH&E) procedures are identified and implemented and their applicability during the planning stage of field investigation projects.

- Allocate appropriate resources to implement the required measures.
- Designate a field staff person to implement and maintain these measures, maintain related documentation, and to communicate with appropriate parties as necessary.
- Consult with the purchasing department on the appropriate vendors for rentals/leases.
- Confirm that boat/watercraft rental/leasing vendors have appropriate paperwork (licenses, insurance, maintenance records, orientations, etc.).
- Confirm that the project is properly staffed with trained employees.
- Require that at least one employee trained in cardiopulmonary resuscitation (CPR) and first aid is on site during work activities.
- Designate at least one employee on site to respond to water emergencies and, as applicable, operate the rescue boat at times when there are employees above, in, or near water.
- Develop and submit a SH&E Plan and other relevant SH&E planning documents for review and approval by the SH&E Manager.
- Develop a written section in the SH&E Plan (or equivalent document) to address worker safety, water rescue, and personnel transfer procedures as required in this standard.
- Confirm Task Hazard Assessments (THA) are completed prior to tasks commencing.

4.1.2 SH&E Manager

Responsible for providing support to the Manager and his/her designee in the evaluation of safety and health risks and the identification of applicable policies, procedures, and appropriate precautions, and as follows:

- Review all project related SH&E Plans and THAs as required.
- Provide access to safety records, including training records, for field staff.
- Provide support to Manager.

4.1.3 Supervisors

Responsible for verifying current status of applicable staff's training and equipping them for the work at hand, and as follows:

- Conduct daily safety meetings to include a review of the hazards and control measures associated with working over/near water. Refer to *S3AM-209-PR1 Risk Assessment & Management*.
- Train employees on their responsibilities, the hazards and the control measures associated with working over/near water.
- Perform SH&E inspections.
- Confirm that all safety issues and equipment deficiencies are properly corrected, and that the proper equipment is available to the field staff to safely meet the goals and quality objectives of the project.

4.1.4 Employees

Responsible for complying with the safe work practices specified in this policy and all other applicable SH&E policies or procedures and reporting all unsafe working conditions, and as follows:

- Review, contribute to, and sign the SH&E Plan prior to beginning the project and whenever new tasks or environmental changes occur.
- Review, contribute to, and sign the THA prior to initiating the associated task.
- Confirming that their SH&E training is up to date.
- Confirming daily that equipment is properly maintained and functioning.
- Confirm they wear all required Personal Protective Equipment (PPE).

4.2 General Safety Considerations

- 4.2.1 During project preparation, consideration shall include, but not be limited to:
- The location and nature of the site.
 - Type of water hazard.
 - Underwater hazards and structures.
 - Access to the worksite and/or water body.
 - Scope of work.
 - Equipment to be used
 - Local climate.
- 4.2.2 The information shall be considered when determining the appropriate controls, PPE, and level of emergency preparedness that is required. All projects working near water hazards shall have an appropriate SH&E Plan and THA prepared. Refer to *S3AM-209-PR1 Risk Assessment & Management*.
- 4.2.3 PPE specified in the SH&E Plan and THA is to be worn as required, to meet the specific regulations of the work area, including as applicable, local and Federal legislation.
- 4.2.4 Whenever there exists the possibility of falling into water, personnel shall be attired in a USCG approved Type III or Type V PFD or Life jacket. Refer to *S3AM315-ATT1 Personal Floatation Devices*. The vest shall be properly sized for the individual and shall be secured at all times. For cold water conditions (water temperature less than 55 degrees Fahrenheit [13 degrees Celsius]), a USCG-approved Shallang/Mustang suit shall be worn to protect personnel from risks of cold water immersion.
- 4.2.5 For work at night, Type II, III, or V PFD should have a chemical light, or other appropriate survival light attached to facilitate rescue. All PFDs shall have reflective tape on them to facilitate visibility at night. For work in non-US areas, the PFD shall be approved by the appropriate local authority, or be approved as an International Maritime Organization (IMO)/Safety of Life at Sea (SOLAS) lifesaving device. This shall include either a Type II buoyant vest or a Type III flotation aid.
- 4.2.6 Swimming is prohibited, unless it is being conducted by certified divers in the completion of their assigned task, or to prevent a serious injury or loss of life in a person in a water/person overboard emergency.
- 4.2.7 The buddy system shall be utilized whenever there is the possibility of falling into water, in which two persons operate as a single unit in order to monitor and assist each other in performing tasks.
- 4.2.8 When work is performed in water where a drowning hazard exists, or on ice, at least one attendant and/or rescue boat operator will be utilized and be available to immediately respond to an emergency and/or launch the rescue boat. The attendant and/or boat operator are not to be assigned other duties beyond safety and rescue.
- 4.2.9 Conducting shoreline work alone should be avoided, unless constant communications is maintained between Staff and Supervisors, and prior approval by the Manager is granted.
- 4.2.10 Confirm a throwable lifebuoy with required rescue line attached (Type IV PFD) is available.
- 4.2.11 Confirm any additional equipment (e.g., sounding alarms, lifting gear, or rescue boat) as required by legislation is immediately available to recover an individual from the water.
- If the shortest dimension of the water body is greater than the length of line attached to the throw buoy, a skiff or boat shall be available to facilitate a rescue.
 - The rescue boat shall be capable of being launched by one person, and shall be properly equipped, and the operator shall be properly qualified per *S3AM-333-PR1 Marine Safety & Vessel Operation*.
 - If a rescue boat is not feasible due to site conditions (e.g., water depth), alternate rescue planning shall be provided in the safety plan.

4.3 Personal Protective Equipment (PPE)

- 4.3.1 PPE shall be selected based on the SH&E Plan and THA, and in accordance with the S3AM-208-PR1 *Personal Protective Equipment*.
- 4.3.2 The minimum PPE required for wading in water above the knees includes:
 - Personal Flotation Devices or lifejackets shall be worn by all workers who are exposed to the danger of drowning in water deep enough for the lifejacket to be effective.
 - All inflatable PFD or life jackets shall be approved and have documented regular inspections.
 - Shallang/Mustang suits – In water temperatures below 55 degrees Fahrenheit (13 degrees Celsius) (regardless of air temperature) personnel are required to wear a USCG-approved Shallang/Mustang jacket or full-flotation suit, depending on field conditions. This requirement will replace the need for a wearable PFD as these suits (if properly maintained) will provide adequate flotation.
 - Waders shall have a slip resistant sole suitable for the substrate.
 - Eye protection shall be worn to reduce glare.
 - Wading pole shall be used for supporting and testing the substrate before wading.
- 4.3.3 Confirm rescue equipment is on site that is appropriate to the situation (e.g., life buoys with 90 feet [28 meters]) of retrieval line, rescue boat, sounding device). Extra buoys shall be 200 feet (60 meters) or less from each other. During night operations, ring buoys shall have a USCG or SOLAS equivalent water light attached.
- 4.3.4 Confirm appropriate emergency supplies are available at the location (e.g. blankets, first aid kit).
- 4.3.5 Immersion suits, or survival suits as they are often called, can significantly improve survival time in cold water.
 - Recognizing that hypothermia is a major factor in lives lost at sea, the USCG requires that vessels operating in offshore waters north of 32 degrees North latitude carry an immersion suit for each person aboard.
 - These suits are to be used in place of a Type I PFD in an abandon ship situation.
 - It is recommended that personnel familiarize themselves with their use and practice donning the suit before leaving the dock. It is recommended that personnel be able to get into an immersion suit in under a minute.
 - If necessary to abandon ship, personnel, attired in an immersion suit with head covered in a hat, should enter the water slowly. If possible, keep the head out of the water.
- 4.3.6 Suits should be stored in a clean and dry location. Avoid stacking or compressing the suits in storage as it may result in a loss of buoyancy. Federal regulations require that immersion suits be stowed so that they are readily accessible to the individual for whom they are intended, from both the individual's normal work area and berthing area. If there is no location readily accessible to both areas, then a suit shall be stowed at each location.
- 4.4 Land-based water work (shoreline/bridge/pier – includes wading)
 - 4.4.1 All shore work shall be performed in accordance with a "Buddy System".
 - 4.4.2 If sampling near or in flowing water environments, be aware of slippery or steep banks and fast currents. If the current is fast or the water looks deeper than knee height, do not enter the water. If you must enter the water, a PFD and restraining system shall be worn and secured to the bank for your retrieval in the event of an emergency.
 - 4.4.3 Whenever possible, positive controls in the form of fencing or barricades should be considered for long-term waterfront projects to form a security perimeter 10 feet in from the water's edge to prevent field staff from being exposed to water hazards.
 - 4.4.4 Field staff involved in sampling contaminated sediments or surface waters or conducting shoreline surveys may require a Hepatitis A and/or tetanus vaccination depending on site conditions and are advised to consult with their Safety, Health and Environment Manager. An Occupational Safety

and Health Administration 40-hour HAZWOPER may be required for field staff working on site if warranted by the Project.

- 4.4.5 Take special care on slippery rocks along shorelines, lakeshores, riverbanks, and creeks. Always look ahead at the ground when walking around the water's edge and avoid stepping on stones that have algal growth, especially those in intertidal areas, as these are extremely slippery. It is suggested that workers not be permitted to access areas where these slip/fall hazards exist, especially in locations containing tidal water flow.

4.4.6 Personal Protective Equipment:

- AECOM requires that whenever there exists the possibility of falling into water, field staff shall be attired in a USCG-approved Type III or Type V work vest. This includes when working near fluid-filled tanks, ponds, lagoons, or natural waterways.
- The PFD vest shall be properly sized for the individual and shall be secured at all times. Prior to and after each use, the PFD/suit shall be inspected for defects, which may alter their strength or buoyancy. Defective units shall be discarded and replaced.
- Staff protective gear shall include long pants with adequate puncture resistance, and gloves appropriate to the hazard(s) (e.g., puncture resistant gloves such as Kevlar when sampling, picking up, or manipulating ground cover). It is recommended that field staff use a rake to move ground cover and debris and not touch these items directly by hand whenever possible.

4.5 Wading in a shallow stream or water body:

- 4.5.1 Chest waders may not be worn when working along, over, or in moving waters; or in waters influenced by tides or acted upon by waves when water depths exceed knee height unless specifically approved by the Manager.

- Chest waders may be worn in still waters in water depths up to the waist if bottom conditions are firm and well understood.
- Chest waders shall never be worn aboard a watercraft of any kind unless specifically approved by the SH&E Manager and required by the task (e.g., rubber or neoprene waders for electrofishing to protect from electric shock).

- 4.5.2 Always proceed upstream so that the wading team is walking into clear water (no turbidity caused by walking), there is good visibility for any debris floating downstream, and there is a reduced risk that the wading team will be pushed against debris or pushed into a deep hole by the current.

- 4.5.3 Wading in water deeper than knee height shall be undertaken as a two-person crew unless alternative suitable measures to control the hazard are employed. If conditions or legislation warrant a "rescue team," then an appropriately sized crew should be used, with the rescue team stationed on the shore with the appropriate rescue equipment, as per the site-specific safety plan.

4.5.4 Wading will not occur in the following circumstances:

- If the water is too turbid or too deep to see tripping hazards or deep holes.
- If it appears the bottom is composed of soft sediments where stepping in may result in sinking, or if the bottom consists of clay where slipping is likely.
- If large woody debris is abundant and will be difficult to step over or move around.
- If the water is over the waist of the shortest person on the wading teaming. This does not preclude wading in water bodies that have shallow shorelines that grade into deeper waters. By not wading over waist level there will be approximately 12 Inches (30 centimeters) of "safety distance" on the chest waders (if worn), should a member of the wading team step or slip into a deeper area.
- If there is a risk of the current pushing a member of the team downstream.
- If there is a risk of exposure to dangerous wildlife, or other hazardous conditions, unless appropriate mitigation procedures are in place.

4.6 Cold Water Operations

- 4.6.1 Cold water operations are defined as any situation that exposes an individual to falling into water that has a temperature of 55 degrees Fahrenheit (13 degrees Celsius) or less.
- 4.6.2 Sudden immersion in cold water can induce a gasping reaction and uncontrolled breathing which may cause the victim to ingest water and begin choking, experience cardiac arrest, and other physical body conditions all of which can result in a quick drowning.
- 4.6.3 Cold water incapacitation precedes hypothermia, making swimming and grasping for safety extremely difficult. So while death by hypothermia may occur in roughly one hour in a water temperature of 55 degrees Fahrenheit (13 degrees Celsius), incapacitation due to failing muscle function will occur in as little as 10 minutes, so regardless of your age, physical conditioning, or ability to swim – your odds of survival are greatly enhanced if you wear a life jacket.
- 4.6.4 AECOM requires personnel to wear a USCG-approved Shallang / Mustang suit at all times whenever there is the risk of falling into cold water. Employees working in these conditions view a training video on the physiological effects of cold water immersion found at: <http://www.coldwaterbootcamp.com>.
- 4.6.5 Consideration should be given to the use of immersion of survival suits when project work involves cold water operations.
- 4.6.6 Water and ambient air temperatures shall be directly measured at the start of each work shift, and no less than once daily. Shift/daily temperature records will be maintained in the site or field notes.
- 4.7 Working on Ice
 - 4.7.1 Working in situations where ice exists shall be strictly limited due to the extreme hazards associated with falling through the ice cap, cold water immersion, and the logistical difficulties associated with executing a rescue.
 - 4.7.2 Specific information and procedures for working on ice can be found in *S3AM-315-ATT2 Ice Safe Work Practices*.
 - 4.7.3 Ice conditions (e.g., thickness, color, cracking) shall be recorded at the start of each work shift, and no less than once daily. Ice condition records will be maintained in the site or field notes. If ice conditions do not meet the criteria specified in *S3AM-315-ATT2 Ice Safe Work Practices*, then work shall not proceed until the required conditions are met.
 - 4.7.4 Personnel working in or on ice shall be attired in a USCG-approved Shallang / Mustang survival suit and be supported by shore side personnel to assist in recovery in the event of a break through. Depending on the nature of the project, on-ice personnel should either wear a harness tethered back to shore, or push a flat bottom boat along on the ice and have the boat tethered back to shore.
 - 4.7.5 Personnel working on ice covered waters should dramatically reduce vessel speed to avoid damaging propellers, shafts, and rudders. Personnel should be cognizant of shoreline ice which can prevent access to alternative ramps and docks that were considered as egress points in emergency planning.
 - 4.7.6 Personnel should be wary that boat ramps on tidally influenced waters can flash freeze at low tide, precluding or compromising safe access and egress.
 - 4.7.7 Extra safety equipment:
 - Extra blankets should be kept on site (in a vehicle) when working on or near frozen water bodies.
 - An ice pick, ice chisel, and/or ice auger should be used by a member of the crew with experience or training in identifying thin or weak ice.
 - A braided rope, preferably 98 feet (30 meters) in length.
- 4.8 Emergency Response

- 4.8.1 Emergency preparedness applies to any work where there exists the risk of falling into water, especially moving waters, along piers, bulkheads, and river banks with a sharp drop off in bathymetry.
- 4.8.2 Field staff working in or alongside waters, especially moving waters, where there exists the possibility of falling in shall have an Emergency Response Plan to recover someone in the event they have fallen in.
- 4.8.3 A throwable rescue device (Class IV PFD) shall be immediately available in the event of an emergency situation. In these situations the position and accessibility of throw rings and other rescue devices (e.g., ladders) and the mechanism to recover a person from the water shall be considered.
- 4.8.4 The number and placement of ladders and throw rings shall be sufficient so that the maximum swimming distance to them is no more than 25 feet.
- 4.8.5 If workers have the potential to get stuck in mud or fluidized sediment, air injection equipment designed to free worker's feet/legs may need to be available on site. At a minimum, a safety line should be available to be deployed from safe ground. If a worker does get stuck, they should not struggle as this causes further sinking. Use a pole to conduct sediment probing to assess water depths, the stability of shoreline terrain, and the bearing capacity of bottom sediments ahead of the chosen path.
- 4.9 Training
 - All Staff and Managers working on projects with exposure to open water shall receive training in their applicable tasks, the hazards, precautions, and rescue procedures associated with working in or over water, refer to the *S3AM-003-PR1 SH&E Training* program.
 - All staff working on or near frozen water bodies shall complete Ice Safety Awareness training.
 - Staff who will be working on frozen water bodies regularly or for extended periods of time should take an Ice Rescue Training course, or obtain management approval based on their level of experience/competence working on ice.
 - Staff working near cold water shall complete awareness level training on Cold Water Immersion.

5.0 Records

- 5.1 None

6.0 Attachments

- 6.1 [S3AM-315-ATT1 Personal Floatation Devices](#)
- 6.2 [S3AM-315-ATT2 Ice Safe Work Practices](#)

Personal Floatation Devices

S3AM-315-ATT1

1.0 Personal Flotation Devices

- 1.1 AECOM requires all personnel to wear a U.S. Coast Guard (USCG)- or Transport Canada (TC)-approved personal flotation device (PFD) or life jacket at all times whenever there exists the possibility of falling into water. The various types of PFDs to be considered are described below. Note: The USCG is working with the PFD community to revise the classification and labelling of PFDs to be redesigned to focus on performance criteria rather than construction standards.
- 1.1.1 **Type I** – Designed for extended survival in rough, open water and best for all waters, open ocean, rough seas, or remote water, where rescue may be slow coming.. This PFD has over 22 pounds of buoyancy and will usually turn an unconscious person face up in the water. It is, however, very bulky and restrictive and not well suited to working on deck; a Type III or Type V PFD is generally preferred. Regardless of this fact, all vessels working in unprotected waters are required to carry a Type I PFD for each person aboard. In the event of an abandon ship situation, all passengers are required to don their Type I PFD as this flotation device will keep you afloat in offshore waters where rescue may be slow in coming.
- 1.1.2 **Type II** – Designed for calm inland waters where there is a chance of a fast rescue. It is less bulky and less expensive than a Type I, and may turn an unconscious person face-up in the water.
- 1.1.3 **Type III** – Designed for use in calm water where there is a good chance of a fast rescue. Slightly lighter than a Type II, this PFD will generally not turn an unconscious person face-up in the water. Shallang/Mustang flotation jackets are considered in the Type III category.
- 1.1.4 **Type IV** – These are first response rescue devices designed to be thrown to a person overboard or person in the water. These devices include boat cushions, ring buoys, and horseshoe buoys. They are NOT designed to be worn and must be supplemented by wearable PFD. These devices need to be stowed in a location and in a manner that makes them immediately available for emergencies. Type IV devices should not be used for small children, non-swimmers, or unconscious people.
- 1.1.5 **Type V** – This is a special-use PFD and includes three-piece work vests, flotation deck suits for hypothermia protection (such as Shallang/Mustang suits), and hybrids for restricted use. Hybrid vests contain some internal buoyancy and are inflatable to provide additional flotation. Immersion suits for cold water survival are also classified as Type V flotation devices.

2.0 Standards

The following standards apply to lifejackets and personal flotation devices:

Association	Standard
United States Coast Guard (USCG) Standard	Lifesaving and Fire Safety Division, Commandant (CG-ENG-4); formerly CG-5214, CG-3PSE-4 and G-MSE-4: Personal Flotation Devices & Lights, Throwable PFDs (Ring Life Buoys & Buoyant Cushions).
Canadian General Standards Board (CGSB)	CGSB Standard CAN/CGSB-65.7-M88, Lifejackets, Inherently Buoyant Type with a minimum buoyancy of 93 N (21 lbs) CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices with a minimum buoyancy of 69 N (15.5 lbs) CGSB Standard 65-GP-14M, Lifejackets, Inherently Buoyant, Standard Type with a minimum buoyancy of 125 N (28 lbs)

Ice Safe Work Practices

S3AM-315-ATT2

1.0 Background

- 1.1 There is no such thing as 100-percent safe ice; there are a number of factors detailed herein which affect the bearing capacity of ice.
- 1.2 New ice is usually stronger than old ice. Four inches of clear, newly-formed ice may support one person on foot, while a foot or more of old, partially-thawed ice may not. Additional bearing capacity guidelines based on ice thickness can be found at: <http://www.dnr.state.mn.us/safety/ice/thickness.html>
- 1.3 Ice seldom freezes uniformly. It may be a foot thick in one location and only an inch or two just a few feet away.
- 1.4 Ice formed over flowing water and currents is often dangerous. This is especially true near streams, bridges and culverts. Also, the ice on the outside of river bends is usually weaker due to the undermining effects of the faster current.
- 1.5 The insulating effect of snow slows down the freezing process. The extra weight also reduces how much weight the ice sheet can support. Also, ice near shore can be weaker than ice that is further out.
- 1.6 Booming and cracking ice isn't necessarily dangerous. It only means that the ice is expanding and contracting as the temperature changes.
- 1.7 Schools of fish or flocks of waterfowl can also adversely affect the relative safety of ice. The movement of fish can bring warm water up from the bottom of the lake opening holes in the ice which can cause snowmobiles and cars to break through.
- 1.8 Heavy snowfall early in the season may result in reduced ice thickness due to the insulating effect of the snow.
- 1.9 A fresh fall of snow will often cover areas that would otherwise be recognized as hazardous.
- 1.10 Water overflow and ponding caused by increased water levels can cover hazardous areas. Be aware of overhanging riverbanks when ascending and descending.

2.0 Safe Work Practices

- 2.1 If considering work on frozen waters or in the presence of shoreline ice, the following requirements shall be followed:
 - 2.1.1 Working in situations where ice exists shall be strictly limited. The risks of cold water immersion; slippery shorelines, docks and boat ramps; and navigation hazards around ice and frozen shorelines should be avoided. Field work should be rescheduled to periods of warmer temperatures, when ice and cold water hazards are not an issue.
 - 2.1.2 Avoid working on water immediately prior to freeze-up because of floating ice sheet hazards. Avoid working on ice prior to break-up because of ice cover instability.
 - 2.1.3 Care should be exercised when near the following areas: tributary/stream inflows, lake narrows, beaver dams, riffle areas, industry discharges, sewage lagoons, and open water, as the ice is usually thinner in these areas. Pressure ridges should also be avoided, as there may be open leads, weak ice and/or slush ice in these areas.
 - 2.1.4 Work shall be performed in accordance with the "Buddy System" with rescue communications available.
 - 2.1.5 Do not walk or work on ice unless there is no other way of performing work. Whenever possible, use alternate methods. One suggestion is to have field staff push a flat-bottomed boat onto the ice.

The boat shall have a safety tether tied to it that can be handled by workers standing off the ice cover along the shore line.

- 2.1.6 Only walk on ice that is fully frozen, not cracked or brittle, with a thickness that will support the necessary weight of workers and associated equipment. Use supplemental traction-control footwear devices to reduce the risk of slips, trips, and falls.
- 2.1.7 If the ice consists of a "crust" that can be easily broken by hand, work may proceed by entering the water in accordance with all other safety procedures described in *S3AM-315-PR1 Working Over & Near Water*; however, the risk of entrapment beneath the ice still exists and work should not be conducted in any moving water, or still water that is more than waist-high.
- 2.1.8 If the ice thickness is such that it can't be easily broken by hand, but is less than the requirements listed in this procedure, then work shall not proceed until one of the prior conditions is met.
- 2.1.9 When working on or near an ice surface, field staff should always check the ice thickness and condition thoroughly using an ice pick, ice chisel, and/or ice auger. It is virtually impossible to describe all conditions that may be encountered while working on ice cover; however, the following can be used as guidelines:
 - The color of ice, which may range from blue to white to grey, provides an indication of its quality and strength.
 - Clear blue ice is generally the strongest.
 - White, opaque ice (snow ice) has relatively high air content and its strength depends on the density; the lower the density, the weaker the ice. High-density white ice has a strength approaching that of clear blue ice.
 - Grey ice generally indicates the presence of water as a result of thawing, and shall be considered highly suspect as a load-bearing surface.
- 2.1.10 Ice conditions (e.g., thickness, color, cracking) and ambient air temperature shall be recorded at the start of each work shift, and no less than once daily. Ambient water temperature shall be recorded along with ice thickness observations, whenever feasible. Ice condition records shall be maintained in the site or field notes. If ice conditions do not meet the criteria above, then work shall not proceed until the required conditions are met.
- 2.1.11 When possible, conduct a reconnaissance prior to freeze-up and prior to actually working on the ice cover to become familiar with any potential hazards.
- 2.2 Personal Protective Equipment (PPE)
 - 2.2.1 PPE shall be selected in accordance with the *S3AM-208-PR1 Personal Protective Equipment* and *S3AM-315-PR1 Working Over & Near Water*.
 - 2.2.2 Workers are required to wear an approved Shallang/Mustang flotation suit in accordance with the manufacturer's requirements.
 - 2.2.3 Workers shall wear a restraining system (a lifeline attached to the front of a full-body harness) and stay close enough to the edge to make it possible for a shoreline attendant to pull the individual back off the ice.
 - 2.2.4 Workers shall have available (on their person) tools that can be used to partially penetrate the ice and gain leverage to help in pulling themselves out of the water and back up onto the ice. Equipment is available with capped ends that can be worn safely until needed.
- 2.3 Unknown Conditions
 - 2.3.1 The following guidelines shall be used when there is insufficient evidence to prove the ice is safe for travel and when the job task cannot be postponed:
 - Select an area where the ice is of good quality and hazards are minimized.
 - Establish a two-person team where one person acts as an "anchorperson" on shore and the second person, connected to the anchorperson by a braided rope, acts as the "checker",

slowly moving out over the ice to sampling locations. (When working on a river, testing with an ice auger or ice bar shall be more frequent than on a lake due to the uncertain nature of river ice.)

- The anchorperson continually looks for hazards and signs of ice failure. (When testing the safety of an ice cover, the best method is to use an ice pick/axe.) The ice in front and to the sides should be struck a solid blow every few paces. The checker should proceed carefully outward checking the ice every few paces. Both staff should work to keep the rope from becoming snagged on ice blocks. The anchorperson should maintain their position as long as the site is deemed hazardous. If the anchorperson has to move, the checker should remain stationary until the anchor has re-established a secure position. When returning from the sample site, the checker should use the above procedure, if required.
- Crews should not be operating on ice greater than 98 feet (30 meters) (or the length of a rope) from shore without appropriate equipment and Rope/Harness Restraint and Rescue System training, unless there is sufficient evidence to prove the ice is safe for travel.

3.0 Vehicle Traffic

- 3.1 Vehicles operated on ice shall travel with their windows down and with their seatbelt off, and their speed should not normally exceed 9 miles per hour (mph) (15 kilometers per hour [km/hr]) (in order to avoid the effects of the hydrodynamic wave). Nor should speed be less than 1 mph (1.5 km/hr), in order to avoid the effects of a stationary load. Ice thickness should be checked frequently when travelling over long stretches of ice.
- 3.2 Particular care should be exercised when approaching or travelling close to shore, or over shallow water, because of severe stressing of the ice due to reflection of the generated wave.
- 3.3 Stationary loads should be relocated to shore as soon as feasible and not left overnight.

The following tables contain guidelines for weight loads on ice.

Table 1. Ice Strength for Continuous Travel

Permissible Load (kg)	Effective Ice Thickness (cm) (clear, blue ice)	
	Lake	River
One person on foot	5.0 (2.0 in)	6.0 (2.4 in)
Group, in single file	8.0 (3.2 in)	9.0 (3.5 in)
Passenger car 2,000 (4,400 lbs)	18 (7.1 in)	21 (8.3 in)
Light truck 2,500 (5,500 lbs)	20 (7.9 in)	23 (9.1 in)
Medium truck 3,500 (7,700 lbs)	26 (10.2 in)	30 (11.8 in)
Heavy truck 7,000 (15,400 lbs)	35 (13.8 in)	41 (16.1 in)
10,000 (22,000 lbs)	38 (15.0 in)	44 (17.3 in)
25,000 (55,100 lbs)	63 (24.8 in)	73 (28.7 in)
45,000 (99,200 lbs)	80 (31.5 in)	92 (36.2 in)
70,000 (154,300 lbs)	100 (39.4 in)	115 (45.3 in)
110,000 (242,500 lbs)	123 (48.4 in)	144 (56.7 in)

Table 2. Ice Strength for Stationary Loads (more than 2 hours) and Working on Ice

Permissible Load (kg)	Effective Ice Thickness (cm) (clear, blue ice)	
	Lake	River
1,000 (2,200 lbs), or less	20 (7.9 in)	23 (9.1 in)
2,000 (4,400 lbs)	30 (11.8 in)	35 (13.8 in)
4,000 (8,800 lbs)	45 (17.7 in)	52 (20.5 in)
8,000 (17,600 lbs)	60 (23.6 in)	69 (27.2 in)
25,000 (55,100 lbs)	110 (43.3 in)	127 (50.0 in)
45,000 (99,200 lbs)	150 (59.1 in)	173 (68.1 in)
70,000 (154,300 lbs)	180 (70.9 in)	207 (81.5 in)
110,000 (242,500 lbs)	230 (90.6 in)	265 (104.3 in)

4.0 Rescue

4.1 If someone falls through ice:

- Do not approach the hole.
- Call the emergency number prior to attempting a rescue.
- Throw a rope or line to the victim to pull them out.
- Get medical assistance for the victim.

4.2 If you fall through the ice:

- Remain calm and look towards the shore.
- Place your hands and arms on the unbroken surface of the ice using the ice picks if available.
- Work forward by kicking your feet.
- If the ice breaks maintain your position and slide forward again.
- Once on the surface of the ice, do not stand. Instead, roll away from the hole.
- Crawl back to shore along your original path.

ATTACHMENT **D**

Stretch and Flex Poster

AECOM

Stretch & Flex Program

SHOULDER STRETCH WITH NECK STRETCH



NECK STRETCH



TRAP STRETCH



UPPER TRUNK STRETCH



LOWER TRUNK STRETCH



TRUNK STRETCH



ATTACHMENT **E**

Site Orientation

E-1: SITE ORIENTATION INSTRUCTIONS AND CHECKLIST

AECOM will conduct a site safety briefing for a person's initial visit to the Site. The briefing will be conducted:

- Prior to the start of work;
- For any new AECOM or subconsultant personnel; and
- At each mobilization, or whenever there is a change in task or significant change in task location.

All personnel working on the project who have received the site briefing (including the HASP review) will sign the Personal Acknowledgement located at the end of the HASP. Visitors may receive a shortened version to address the hazards specific to their visit.

The following items, at minimum, will be discussed during the site safety briefing:

- Contents of this HASP;
- The Emergency Response Plan;
- Contractor SH&E Management expectations;
- Injury management, including notification and hospital and occupational clinic locations;
- The AECOM 4-Sight program;
- Stop Work authority;
- The THAs (**Attachment B**) for the tasks that will be performed on a given project;
- Types of hazards at the Site and means for minimizing exposure to them;
- Instructions for new operations to be conducted, and safe work practices;
- PPE that must be used;
- Lone worker check-in procedures;
- Emergency evacuation routes, muster points, and tornado/storm shelters; and
- Location and use of emergency equipment.

These meetings must be documented and maintained in the project files.

ATTACHMENT **F**

Safety Data Sheets



Safety Data Sheet

Material Name: CREOSOTE - PETROLEUM PRESSURE TREATED WOOD

SDS ID: 00230493

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name

CREOSOTE - PETROLEUM PRESSURE TREATED WOOD

Product Use

Used for industrial wood products, specifically Railroad ties.

Restrictions on Use

Creosote treated wood is intended for exterior/outdoor uses and only those applications approved by the American Wood Protection Association (AWPA) Use Category System as set forth in the most current edition of the AWPA Book of Standards. Refer to preservative label for more details.

Details of the supplier of the safety data sheet

KOPPERS INC.

436 Seventh Avenue

Pittsburgh, PA 15219-1800

Mfg Contact: 412-227-2001 (SDS Requests: 866-852-5239)

CHEMTREC: 800-424-9300 (Outside USA: +1 703-527-3887)

Emergencies: (Medical in USA): 877-737-9047

Emergencies: (Medical Outside of USA): 651-632-9269

E-mail: naorgmsds@koppers.com

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.

Combustible Dust

Acute Toxicity - Inhalation - Dust/Mist - Category 4

Skin Corrosion/Irritation - Category 2

Serious Eye Damage/Eye Irritation - Category 2A

Respiratory Sensitization - Category 1

Skin Sensitization - Category 1

Carcinogenicity - Category 1A

Specific target organ toxicity - Single exposure - Category 3 (respiratory system)

GHS Label Elements

Symbol(s)



Signal Word

Danger

Hazard Statement(s)

May form combustible dust concentrations in air (during handling or processing).

Harmful if inhaled.

Causes skin irritation.

Causes serious eye irritation.

May cause allergy or asthma symptoms or breathing difficulties if inhaled.



Safety Data Sheet

Material Name: CREOSOTE - PETROLEUM PRESSURE TREATED WOOD

SDS ID: 00230493

May cause an allergic skin reaction.
May cause cancer.
May cause respiratory irritation.

Precautionary Statement(s)

Prevention

Avoid breathing dust.
Wash thoroughly after handling.
Wear respiratory protection.
Contaminated work clothing should not be allowed out of the workplace.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/clothing and eye/face protection.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.

Response

IF exposed or concerned: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water.
If skin irritation or rash occurs: Get medical advice/attention.
Take off contaminated clothing and wash before reuse.
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.

Storage

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

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Statement(s) of Unknown Acute Toxicity

Inhalation 84% of the mixture consists of ingredient(s) of unknown acute toxicity.

Other Hazards

None known.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component Name	Percent
Not Available	WOOD DUST, HARDWOODS	<85
8001-58-9	COAL TAR CREOSOTE	<13
64741-59-9	Petroleum distillates, light catalytic cracked	<3

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Wood dusts hard wood, Wood dusts (birch, mahogany, teak, walnut), Wood dusts (all other wood dusts), Wood dust, western red cedar, Wood dust, all soft and hard woods, Particulates not otherwise classified (PNOC), Creosotes, Aromatic hydrocarbons, polycyclic (130489-29-2).



Safety Data Sheet

Material Name: CREOSOTE - PETROLEUM PRESSURE TREATED WOOD

SDS ID: 00230493

Section 4 - FIRST AID MEASURES

Inhalation

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

Skin

Take off contaminated clothing. Wash with plenty of soap and water. Thoroughly clean and dry contaminated clothing and shoes before reuse. Skin contact causes photosensitization which can last for 36-72 hours after exposure. Keep out of direct sunlight for the next two to three days to avoid sunburn to the photosensitized skin areas. Use a broad spectrum blockout cream to protect against UV alpha ray exposure. Get medical attention, if needed.

Eyes

DO NOT rub eyes. Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion

If swallowed, get medical attention.

Most Important Symptoms/Effects

Acute

harmful if inhaled, respiratory tract irritation, skin irritation, eye irritation, allergic reactions

Delayed

allergic reactions, nasal cancer, skin cancer

Indication of any immediate medical attention and special treatment needed

For inhalation, consider oxygen.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media

water stream, water spray or fog

Unsuitable Extinguishing Media

Do not scatter spilled material with high-pressure water streams.

Special Hazards Arising from the Chemical

Slight fire hazard. Avoid generating dust.

Hazardous Combustion Products

Oxides of carbon, oxides of nitrogen

Fire Fighting Measures

Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Keep unnecessary people away, isolate hazard area and deny entry.

Special Protective Equipment and Precautions for Firefighters

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

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment, see Section 8. Avoid release to the environment. Collect spillage.

Methods and Materials for Containment and Cleaning Up



Safety Data Sheet

Material Name: CREOSOTE - PETROLEUM PRESSURE TREATED WOOD

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Collect material in appropriate container for disposal. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Collect using a vacuum cleaner with a HEPA filter or wet and scoop up dry spills. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid sweeping spilled dry material. If sweeping of a contaminated area is necessary, use a dust suppressant agent. Eliminate all sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Due to the concentration of Creosote and the CERCLA (40 CFR 302.4) reportable quantity of 1 pound, the release of 6 pounds of this product requires National Response Center notification.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling

Avoid breathing dust. Wash thoroughly after handling. Wear respiratory protection. Contaminated work clothing should not be allowed out of the workplace. Do not eat, drink, or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/clothing and eye/face protection. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Avoid significant deposits of material, especially on horizontal surfaces, which may become airborne and form combustible dust clouds and may contribute to secondary explosions. Dry wood dust material is defined as having a water content less than 25% by weight. Avoid frequent or prolonged inhalation of sawdust from treated wood. When sawing and machining treated wood, wear a dust mask. When power-sawing and machining, wear goggles to protect eyes from flying particles. Whenever possible, these operations should be performed outdoors to avoid indoor accumulations of airborne sawdust from treated wood. Avoid frequent or prolonged skin contact with creosote-treated wood; when handling the treated wood, wear long-sleeved shirts and long pants and use gloves impervious to the chemicals (for example, gloves that are vinyl-coated). Use protective skin cream on exposed skin before and during work shift. To reduce sun sensitivity a sun-blocking lotion can also be applied prior to application of a protective cream. After working with the wood, and before eating, drinking and use of tobacco products, wash exposed areas thoroughly. If oily preservative or sawdust accumulate on clothes, launder before reuse. Wash work clothes separately from other household clothing.

Conditions for Safe Storage, Including any Incompatibilities

Store in a well-ventilated place.

Store locked up.

Store and handle in accordance with all current regulations and standards. Avoid heat, flames, sparks and other sources of ignition. Keep container tightly closed.

Incompatible Materials

oxidizing materials, acids

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

In *AFL-CIO v OSHA*, 965 F. 2d 962 (11th Cir. 1992), the Court overturned OSHA's 1989 Air Contaminants Rule, including the specific PEL's for wood dust that OSHA had established at that time. The 1989 vacated PEL's were: 5 mg/m³ PEL-TWA and 10 mg/m³ STEL (15 min), all softwood and hardwood except Western Red Cedar. Wood dust is now regulated by OSHA as "Particulates Not Otherwise Regulated" (PNOR), which is also referred to as "nuisance dust". However, some states have incorporated the 1989 OSHA PEL's in their state plans. Additionally, OSHA indicated that it may cite employers under the OSHA general duty clause in appropriate circumstances for noncompliance with the 1989 PEL's. Creosote is a complex mixture of variable composition, and while no odor threshold for creosote has been established, work done at the University of California has measured the odor thresholds for one of the more volatile components in creosote and determined that the involved odor threshold is in the part per billion range, and well below applicable exposure limits. On the basis of these data the perception of creosote odor in and of itself should not be taken as an indication of exposure in excess of accepted exposure limits. Exposure to wood dust would not be expected under normal use conditions. If handling or use patterns associated with creosote treated wood involve the use of a power saw, sander, drill or any tool or activity resulting in the generation of airborne particulate the wood dust exposure limits should be observed and appropriate steps taken to minimize exposure.



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Component Exposure Limits

WOOD DUST, HARDWOODS	Not Available
ACGIH:	1 mg/m3 TWA inhalable particulate matter (related to Wood dusts (all other wood dusts))
OSHA (US):	15 mg/m3 TWA total dust ; 5 mg/m3 TWA respirable fraction (related to Particulates not otherwise classified (PNOC))
	15 mppcf TWA respirable fraction ; 5 mg/m3 TWA respirable fraction ; 50 mppcf TWA total dust ; 15 mg/m3 TWA total dust (related to Particulates not otherwise classified (PNOC))
COAL TAR CREOSOTE	8001-58-9
ACGIH:	0.2 mg/m3 TWA as benzene-soluble aerosol (related to Pitch, coal tar, high-temperature)
OSHA (US):	0.2 mg/m3 TWA (benzene soluble fraction) (related to Pitch, coal tar, high-temperature)
Petroleum distillates, light catalytic cracked	64741-59-9
ACGIH:	0.2 mg/m3 TWA as benzene-soluble aerosol (related to Pitch, coal tar, high-temperature)
OSHA (US):	0.2 mg/m3 TWA (benzene soluble fraction) (related to Pitch, coal tar, high-temperature)

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)

COAL TAR CREOSOTE (8001-58-9)

2.5 µg/l Medium: urine Time: end of shift at end of workweek Parameter: 1-Hydroxypyrene with hydrolysis (background) ; Medium: urine Time: end of shift at end of workweek Parameter: 3-Hydroxybenzo(a)pyrene with hydrolysis (nonquantitative) (related to Polycyclic aromatic hydrocarbons)

Petroleum distillates, light catalytic cracked (64741-59-9)

2.5 µg/l Medium: urine Time: end of shift at end of workweek Parameter: 1-Hydroxypyrene with hydrolysis (background) ; Medium: urine Time: end of shift at end of workweek Parameter: 3-Hydroxybenzo(a)pyrene with hydrolysis (nonquantitative) (related to Polycyclic aromatic hydrocarbons)

Engineering Controls

Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust or process enclosure ventilation system. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection

ANSI Z87.1-1989 approved safety glasses with side shields.

Skin Protection

Wear tightly woven long-sleeved shirts and long pants. Remove and launder contaminated clothing separately from other laundry before reuse.



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Respiratory Protection

Any air-purifying respirator with a high-efficiency particulate filter.

Glove Recommendations

Individuals must wear gloves impervious to the wood treatment formulations in all situations where dermal contact with creosote is expected.

Protective Materials

Examples of impervious materials for protective clothing (e.g. overalls, jackets, gloves and boots) required during application and handling of creosote are polyvinyl acetate (PVA), polyvinyl chloride (PVC), Neoprene and NBR (Buna-N). Protective clothing must be changed when it shows signs of contamination.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	dark brown to black solid	Physical State	solid
Odor	tar odor	Color	dark , brown to black
Odor Threshold	Not available	pH	Not applicable
Melting Point	Not applicable	Boiling Point	Not applicable
Boiling Point Range	Not available	Freezing point	Not applicable
Evaporation Rate	Not applicable	Flammability (solid, gas)	Not flammable
Autoignition Temperature	Not available	Flash Point	Not applicable
Lower Explosive Limit	Not available	Decomposition temperature	Not available
Upper Explosive Limit	Not available	Vapor Pressure	Not applicable
Vapor Density (air=1)	Not applicable	Specific Gravity (water=1)	Not available
Water Solubility	Not available	Partition coefficient: n-octanol/water	Not available
Viscosity	Not applicable	Kinematic viscosity	Not available
Solubility (Other)	Not available	Density	Not available
Physical Form	Pressure cross ties – treated at a retention level of 6 lbs/ft ³ , with a wood density of 45-55 lbs/ft ³ , Actual	Molecular Weight	Not available



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	retention level dependent on wood stock, moisture levels, and customer specifications		

Other Information

No additional information is available.

Section 10 - STABILITY AND REACTIVITY

Reactivity

No reactivity hazard is expected.

Chemical Stability

Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions

Will not polymerize.

Conditions to Avoid

Avoid heat, flames, sparks and other sources of ignition. Avoid accumulation of airborne dusts. Avoid contact with incompatible materials.

Incompatible Materials

oxidizing materials, Acids

Hazardous decomposition products

oxides of carbon, oxides of nitrogen

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation

irritation, allergic reactions, nasal cancer

Skin Contact

irritation, allergic reactions, skin cancer

Eye Contact

irritation

Ingestion

gastrointestinal irritation, bloating

Acute and Chronic Toxicity

Component Analysis - LD50/LC50

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

COAL TAR CREOSOTE (8001-58-9)

Oral LD50 Rat 2197 mg/kg

Dermal Rabbit >2000 mg/kg LD50

Inhalation Rat >5 mg/L 4 hr LC50

Petroleum distillates, light catalytic cracked (64741-59-9)

Oral LD50 Rat 6790 - 7180 mg/kg

Dermal LD50 Rabbit >2000 mg/kg (no deaths occurred)

Inhalation LC50 Rat 5.4 g/L 4 h

Product Toxicity Data

Acute Toxicity Estimate



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Dermal	>2000 mg/kg
Inhalation - Dust and Mist	4.67 mg/L
Oral	>2000 mg/kg

Immediate Effects

harmful if inhaled, respiratory tract irritation, skin irritation, eye irritation, allergic reactions

Delayed Effects

allergic reactions, nasal cancer, skin cancer

Irritation/Corrosivity Data

No data available.

Respiratory Sensitization

Component data indicate the substance is sensitizing.

Dermal Sensitization

Component data indicate the substance is sensitizing.

Component Carcinogenicity

WOOD DUST, HARDWOODS	Not Available
ACGIH:	A1 - Confirmed Human Carcinogen (related to Wood dusts-hard wood)
IARC:	Monograph 100C [2012] ; Monograph 62 [1995] (related to Wood dust, all soft and hard woods) (Group 1 (carcinogenic to humans))
NTP:	Known Human Carcinogen (related to Wood dust, all soft and hard woods)
NIOSH:	potential occupational carcinogen (related to Wood dust, all soft and hard woods)
COAL TAR CREOSOTE	8001-58-9
ACGIH:	A1 - Confirmed Human Carcinogen (related to Pitch, coal tar, high-temperature)
IARC:	Monograph 100F [2012] ; Supplement 7 [1987] ; Monograph 35 [1985] (related to Pitch, coal tar, high-temperature) (Group 1 (carcinogenic to humans))
IARC:	Monograph 92 [2010] ; Supplement 7 [1987] ; Monograph 35 [1985] (Group 2A (probably carcinogenic to humans))
NTP:	Known Human Carcinogen (related to Pitch, coal tar, high-temperature)
NIOSH:	potential occupational carcinogen
Petroleum distillates, light catalytic cracked	64741-59-9



Safety Data Sheet

Material Name: CREOSOTE - PETROLEUM PRESSURE TREATED WOOD

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ACGIH:	A1 - Confirmed Human Carcinogen (related to Pitch, coal tar, high-temperature)
IARC:	Monograph 100F [2012] ; Supplement 7 [1987] ; Monograph 35 [1985] (related to Pitch, coal tar, high-temperature) (Group 1 (carcinogenic to humans))
NTP:	Known Human Carcinogen (related to Pitch, coal tar, high-temperature)
NIOSH:	potential occupational carcinogen (related to Pitch, coal tar, high-temperature)

Germ Cell Mutagenicity

No data available.

Tumorigenic Data

No data available

Reproductive Toxicity

No data available.

Specific Target Organ Toxicity - Single Exposure

respiratory system

Specific Target Organ Toxicity - Repeated Exposure

No data available.

Aspiration hazard

No data available.

Medical Conditions Aggravated by Exposure

respiratory disorders, skin disorders and allergies

Additional Data

COAL TAR CREOSOTE: This product contains coal tar creosote. Volume 35 of the IARC monograph states that there is limited evidence that coal tar derived creosotes are carcinogenic in humans and sufficient evidence for the carcinogenicity of creosote in experimental animals. Limitations in the human exposure studies reviewed by IARC (including the presence of other chemicals, small study populations and not well documented exposure levels) contributed to IARC's conclusions regarding human exposure to creosote. When applied to the skin of mice in experimental studies, creosote produced skin tumors and in one study produced lung tumors. Most available information on the effects of coal tar creosote in humans comes from older occupational studies in the wood-preserving and construction industries. Today, with the use of engineering controls and personal protective equipment, occupational exposure to creosote components is expected to be below permissible exposure limits (measured as Coal Tar Pitch Volatiles). Wood dust is particles of varying size produced from processing or handling wood. Cancer of the nasal cavities and sinuses is associated with exposure to hardwood dust. IARC concluded that there were too few studies to evaluate cancer risks attributable to exposure to softwood alone and to any particular species of wood. In view of the overall lack of consistent findings, IARC also concluded that there is no indication that occupational exposure to wood dust has a causal role in cancers of the throat, lung, lymphatic and blood systems, stomach, colon or rectum. PETROLEUM DISTILLATES, LIGHT CATALYTIC CRACKED: High incidences of benign and malignant skin tumors have been reported in mouse skin application testing and IARC reports there is sufficient evidence for the carcinogenicity in animals of light catalytically cracked distillates. IARC determined there is sufficient evidence for carcinogenicity in experimental animals of light and heavy vacuum distillates, of light and heavy catalytically cracked distillates and of cracked residues (including heavy thermocracked distillates/residues) from the refining of crude oil. Different woods produce different health effects and there is evidence that wood from different trees of the same species can produce varying health effects. Woods other than Western Red Cedar (WRC) seem unlikely to be responsible for large numbers of cases of respiratory



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allergies. Other common wood dusts produce asthma/pulmonary effects that are less well described than the responses to WRC. These other wood species (e.g., oak and pine) are considered somewhat allergenic.

Section 12 - ECOLOGICAL INFORMATION

Component Analysis - Aquatic Toxicity

COAL TAR CREOSOTE	8001-58-9
Fish:	LC50 96 h Brachydanio rerio 2.6 - 6.6 mg/L [static]; LC50 96 h Oncorhynchus mykiss 0.57 mg/L [static]
Invertebrate:	EC50 48 h Daphnia magna 1.04 mg/L IUCLID ; EC50 48 h Daphnia magna 0.065 - 0.082 mg/L [Static] EPA
Petroleum distillates, light catalytic cracked	64741-59-9
Fish:	LC50 96 h Brachydanio rerio 7.3 mg/L [semi-static]

Persistence and Degradability

No information available for the product.

Bioaccumulative Potential

No information available for the product.

Mobility

No information available for the product.

Other Toxicity

No data available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods

Dispose in accordance with all applicable regulations. Treated wood should not be burned in open fires or in stoves, fireplaces or residential boilers, because toxic chemicals may be produced as part of the smoke and ashes. Treated wood from commercial or industrial use (e.g., construction sites) may be burned only in commercial or industrial incinerators or boilers in accordance with state and federal regulations. For more information please see Koppers Consumer Information Sheet for this product. RCRA Waste Number U051 – applies only to creosote in liquid form.

Component Waste Numbers

The U.S. EPA has not published waste numbers for this product's components.

Section 14 - TRANSPORT INFORMATION

US DOT Information:

Further information: No classification assigned

IATA Information:

Further information: No classification assigned

TDG Information:

Further information: No classification assigned

International Bulk Chemical Code

This material contains one or more of the following chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.



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COAL TAR CREOSOTE	8001-58-9
IBC Code:	Category X (coal tar)
Petroleum distillates, light catalytic cracked	64741-59-9
IBC Code:	Category X (related to Polycyclic aromatic hydrocarbons)

Further information

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

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations

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

COAL TAR CREOSOTE	8001-58-9
SARA 313:	0.1 % de minimis concentration
CERCLA:	1 lb final RQ ; 0.454 kg final RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories

Combustible Dust; Carcinogenicity; Skin Corrosion/Irritation; Respiratory/Skin Sensitization; Serious Eye Damage/Eye Irritation; Specific Target Organ Toxicity

U.S. State Regulations

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

Component	CAS	CA	MA	MN	NJ	PA
WOOD DUST, HARDWOODS	Not Available	No	No	Yes	Yes	Yes
COAL TAR CREOSOTE	8001-58-9	Yes	Yes	Yes	Yes	Yes
Petroleum distillates, light catalytic cracked	64741-59-9	Yes	Yes	Yes	Yes	Yes

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)



WARNING

This product can expose you to chemicals including WOOD DUST, HARDWOODS, COAL TAR CREOSOTE , which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Canada Regulations

Canadian WHMIS Ingredient Disclosure List (IDL)



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Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL

COAL TAR CREOSOTE	8001-58-9
	0.1 % (related to Pitch, coal tar, high-temperature)
Petroleum distillates, light catalytic cracked	64741-59-9
	0.1 % (related to Pitch, coal tar, high-temperature)

WHMIS Classification

D2A , D2B

Component Analysis - Inventory

WOOD DUST, HARDWOODS (Not Available)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

COAL TAR CREOSOTE (8001-58-9)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	No

Petroleum distillates, light catalytic cracked (64741-59-9)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes	Yes

U.S. Inventory (TSCA)

This product is exempt.

Section 16 - OTHER INFORMATION

Further information

This wood product contains a pesticide product registered by the United States Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the



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SDS ID: 00230493

classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. The pesticide label also includes other important information, including directions for use.

NFPA Ratings

Health: 2 Fire: 1 Reactivity: 0

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

Summary of Changes

Updated: 7/20/2018; MSDS SUMMARY OF CHANGES: SECTION 15 - CA Proposition 65

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC - European Commission; EEC - European Economic Community; EIN - European Inventory of (Existing Commercial Chemical Substances); EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; F - Background (for Venezuela Biological Exposure Indices); IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR KECI Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL) , KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX - Mexico; Ne - Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL - Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL - Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH - Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA - Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW - Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information

Disclaimer:

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



Safety Data Sheet

Material Name: Gasoline All Grades

SDS No. 9950
US GHS

Synonyms: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

*** Section 1 - Product and Company Identification ***

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

*** Section 2 - Hazards Identification ***

GHS Classification:

Flammable Liquid - Category 2
Skin Corrosion/Irritation - Category 2
Germ Cell Mutagenicity - Category 1B
Carcinogenicity - Category 1B
Toxic to Reproduction - Category 1A
Specific Target Organ Toxicity (Single Exposure) - Category 3 (respiratory irritation, narcosis)
Specific Target Organ Toxicity (Repeat Exposure) - Category 1 (liver, kidneys, bladder, blood, bone marrow, nervous system)
Aspiration Hazard - Category 1
Hazardous to the Aquatic Environment – Acute Hazard - Category 3

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

DANGER

Hazard Statements

Highly flammable liquid and vapour.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs (liver, kidneys, bladder, blood, bone marrow, nervous system) through prolonged or repeated exposure.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Safety Data Sheet

Material Name: Gasoline All Grades

SDS No. 9950

Precautionary Statements

Prevention

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

Response

In case of fire: Use water spray, fog, dry chemical fire extinguishers or hand held fire extinguisher.
IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing and wash before reuse. If skin irritation occurs, get medical advice/attention.
IF exposed or concerned: Get medical advice/attention.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.
Get medical advice/attention if you feel unwell.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting.

Storage

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

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
86290-81-5	Gasoline, motor fuel	100
108-88-3	Toluene	1-25
106-97-8	Butane	<10
1330-20-7	Xylenes (o-, m-, p- isomers)	1-15
95-63-6	Benzene, 1,2,4-trimethyl-	<6
64-17-5	Ethyl alcohol	0-10
100-41-4	Ethylbenzene	<3
71-43-2	Benzene	0.1-4.9

Safety Data Sheet

Material Name: Gasoline All Grades

SDS No. 9950

110-54-3	Hexane	0.5-4

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol). Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO₂, water spray, fire fighting foam, or gaseous extinguishing agent.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration.

Unsuitable Extinguishing Media

None

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Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

*** Section 6 - Accidental Release Measures ***

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

*** Section 7 - Handling and Storage ***

Handling Procedures

USE ONLY AS A MOTOR FUEL.
DO NOT SIPHON BY MOUTH

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

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Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Incompatibilities

Keep away from strong oxidizers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Gasoline, motor fuel (86290-81-5)

ACGIH: 300 ppm TWA
500 ppm STEL

Toluene (108-88-3)

ACGIH: 20 ppm TWA
OSHA: 200 ppm TWA; 375 mg/m³ TWA
150 ppm STEL; 560 mg/m³ STEL
NIOSH: 100 ppm TWA; 375 mg/m³ TWA
150 ppm STEL; 560 mg/m³ STEL

Butane (106-97-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)
OSHA: 800 ppm TWA; 1900 mg/m³ TWA
NIOSH: 800 ppm TWA; 1900 mg/m³ TWA

Xylenes (o-, m-, p- isomers) (1330-20-7)

ACGIH: 100 ppm TWA
150 ppm STEL
OSHA: 100 ppm TWA; 435 mg/m³ TWA
150 ppm STEL; 655 mg/m³ STEL

Benzene, 1,2,4-trimethyl- (95-63-6)

NIOSH: 25 ppm TWA; 125 mg/m³ TWA

Ethyl alcohol (64-17-5)

ACGIH: 1000 ppm STEL
OSHA: 1000 ppm TWA; 1900 mg/m³ TWA
NIOSH: 1000 ppm TWA; 1900 mg/m³ TWA

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Ethylbenzene (100-41-4)

ACGIH: 20 ppm TWA
OSHA: 100 ppm TWA; 435 mg/m³ TWA
125 ppm STEL; 545 mg/m³ STEL
NIOSH: 100 ppm TWA; 435 mg/m³ TWA
125 ppm STEL; 545 mg/m³ STEL

Benzene (71-43-2)

ACGIH: 0.5 ppm TWA
2.5 ppm STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH: 0.1 ppm TWA
1 ppm STEL

Hexane (110-54-3)

ACGIH: 50 ppm TWA
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 500 ppm TWA; 1800 mg/m³ TWA
NIOSH: 50 ppm TWA; 180 mg/m³ TWA

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

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*** Section 9 - Physical & Chemical Properties ***

Appearance:	Translucent, straw-colored or light yellow	Odor:	Strong, characteristic aromatic hydrocarbon odor. Sweet-ether like
Physical State:	Liquid	pH:	ND
Vapor Pressure:	6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)	Vapor Density:	AP 3-4
Boiling Point:	85-437 °F (39-200 °C)	Melting Point:	ND
Solubility (H2O):	Negligible to Slight	Specific Gravity:	0.70-0.78
Evaporation Rate:	10-11	VOC:	ND
Percent Volatile:	100%	Octanol/H2O Coeff.:	ND
Flash Point:	-45 °F (-43 °C)	Flash Point Method:	PMCC
Upper Flammability Limit (UFL):	7.6%	Lower Flammability Limit (LFL):	1.4%
Burning Rate:	ND	Auto Ignition:	>530°F (>280°C)

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

*** Section 11 - Toxicological Information ***

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Gasoline, motor fuel (86290-81-5)

Inhalation LC50 Rat >5.2 mg/L 4 h; Oral LD50 Rat 14000 mg/kg; Dermal LD50 Rabbit >2000 mg/kg

Toluene (108-88-3)

Inhalation LC50 Rat 12.5 mg/L 4 h; Inhalation LC50 Rat >26700 ppm 1 h; Oral LD50 Rat 636 mg/kg; Dermal LD50 Rabbit 8390 mg/kg; Dermal LD50 Rat 12124 mg/kg

Butane (106-97-8)

Inhalation LC50 Rat 658 mg/L 4 h

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Xylenes (o-, m-, p- isomers) (1330-20-7)

Inhalation LC50 Rat 5000 ppm 4 h; Inhalation LC50 Rat 47635 mg/L 4 h; Oral LD50 Rat 4300 mg/kg; Dermal LD50 Rabbit >1700 mg/kg

Benzene, 1,2,4-trimethyl- (95-63-6)

Inhalation LC50 Rat 18 g/m³ 4 h; Oral LD50 Rat 3400 mg/kg; Dermal LD50 Rabbit >3160 mg/kg

Ethyl alcohol (64-17-5)

Oral LD50 Rat 7060 mg/kg; Inhalation LC50 Rat 124.7 mg/L 4 h

Ethylbenzene (100-41-4)

Inhalation LC50 Rat 17.2 mg/L 4 h; Oral LD50 Rat 3500 mg/kg; Dermal LD50 Rabbit 15354 mg/kg

Benzene (71-43-2)

Inhalation LC50 Rat 13050-14380 ppm 4 h; Oral LD50 Rat 1800 mg/kg

Hexane (110-54-3)

Inhalation LC50 Rat 48000 ppm 4 h; Oral LD50 Rat 25 g/kg; Dermal LD50 Rabbit 3000 mg/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Moderate irritant. Contact with liquid or vapor may cause irritation.

Potential Health Effects: Ingestion

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This product may cause genetic defects.

Carcinogenicity

A: General Product Information

May cause cancer.

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IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

B: Component Carcinogenicity

Gasoline, motor fuel (86290-81-5)

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

Toluene (108-88-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: Monograph 71 [1999]; Monograph 47 [1989] (Group 3 (not classifiable))

Xylenes (o-, m-, p- isomers) (1330-20-7)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: Monograph 71 [1999]; Monograph 47 [1989] (Group 3 (not classifiable))

Ethyl alcohol (64-17-5)

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

IARC: Monograph 100E [in preparation] (in alcoholic beverages); Monograph 96 [2010] (in alcoholic beverages) (Group 1 (carcinogenic to humans))

Ethylbenzene (100-41-4)

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

IARC: Monograph 77 [2000] (Group 2B (possibly carcinogenic to humans))

Benzene (71-43-2)

ACGIH: A1 - Confirmed Human Carcinogen

OSHA: 5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA

NIOSH: potential occupational carcinogen

NTP: Known Human Carcinogen (Select Carcinogen)

IARC: Monograph 100F [in preparation]; Supplement 7 [1987]; Monograph 29 [1982] (Group 1 (carcinogenic to humans))

Reproductive Toxicity

This product is suspected of damaging fertility or the unborn child.

Specified Target Organ General Toxicity: Single Exposure

This product may cause drowsiness or dizziness.

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Specified Target Organ General Toxicity: Repeated Exposure

This product causes damage to organs through prolonged or repeated exposure.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

*** Section 12 - Ecological Information ***

Ecotoxicity

A: General Product Information

Very toxic to aquatic life with long lasting effects. Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Gasoline, motor fuel (86290-81-5)

Test & Species

Conditions

96 Hr LC50 Alburnus alburnus	119 mg/L [static]
96 Hr LC50 Cyprinodon variegatus	82 mg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	56 mg/L
24 Hr EC50 Daphnia magna	170 mg/L

Toluene (108-88-3)

Test & Species

Conditions

96 Hr LC50 Pimephales promelas	15.22-19.05 mg/L [flow-through]	1 day old
96 Hr LC50 Pimephales promelas	12.6 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	5.89-7.81 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	14.1-17.16 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	5.8 mg/L [semi-static]	
96 Hr LC50 Lepomis macrochirus	11.0-15.0 mg/L [static]	
96 Hr LC50 Oryzias latipes	54 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.2 mg/L [semi-static]	
96 Hr LC50 Poecilia reticulata	50.87-70.34 mg/L [static]	
96 Hr EC50 Pseudokirchneriella subcapitata	>433 mg/L	
72 Hr EC50 Pseudokirchneriella subcapitata	12.5 mg/L [static]	
48 Hr EC50 Daphnia magna	5.46 - 9.83 mg/L [Static]	
48 Hr EC50 Daphnia magna	11.5 mg/L	

Xylenes (o-, m-, p- isomers) (1330-20-7)

Test & Species

Conditions

96 Hr LC50 Pimephales promelas	13.4 mg/L [flow-through]

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96 Hr LC50 Oncorhynchus mykiss	2.661-4.093 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	13.5-17.3 mg/L
96 Hr LC50 Lepomis macrochirus	13.1-16.5 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	19 mg/L
96 Hr LC50 Lepomis macrochirus	7.711-9.591 mg/L [static]
96 Hr LC50 Pimephales promelas	23.53-29.97 mg/L [static]
96 Hr LC50 Cyprinus carpio	780 mg/L [semi- static]
96 Hr LC50 Cyprinus carpio	>780 mg/L
96 Hr LC50 Poecilia reticulata	30.26-40.75 mg/L [static]
48 Hr EC50 water flea	3.82 mg/L
48 Hr LC50 Gammarus lacustris	0.6 mg/L

Benzene, 1,2,4-trimethyl- (95-63-6)

Test & Species

Conditions

96 Hr LC50 Pimephales promelas	7.19-8.28 mg/L [flow-through]
48 Hr EC50 Daphnia magna	6.14 mg/L

Ethyl alcohol (64-17-5)

Test & Species

Conditions

96 Hr LC50 Oncorhynchus mykiss	12.0 - 16.0 mL/L [static]
96 Hr LC50 Pimephales promelas	>100 mg/L [static]
96 Hr LC50 Pimephales promelas	13400 - 15100 mg/L [flow-through]
48 Hr LC50 Daphnia magna	9268 - 14221 mg/L
24 Hr EC50 Daphnia magna	10800 mg/L
48 Hr EC50 Daphnia magna	2 mg/L [Static]

Ethylbenzene (100-41-4)

Test & Species

Conditions

96 Hr LC50 Oncorhynchus mykiss	11.0-18.0 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	4.2 mg/L [semi- static]
96 Hr LC50 Pimephales promelas	7.55-11 mg/L [flow- through]
96 Hr LC50 Lepomis macrochirus	32 mg/L [static]
96 Hr LC50 Pimephales promelas	9.1-15.6 mg/L [static]
96 Hr LC50 Poecilia reticulata	9.6 mg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	4.6 mg/L
96 Hr EC50 Pseudokirchneriella subcapitata	>438 mg/L
72 Hr EC50 Pseudokirchneriella subcapitata	2.6 - 11.3 mg/L [static]

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96 Hr EC50 Pseudokirchneriella subcapitata	1.7 - 7.6 mg/L [static]
48 Hr EC50 Daphnia magna	1.8 - 2.4 mg/L

Benzene (71-43-2)

Test & Species

Conditions

96 Hr LC50 Pimephales promelas	10.7-14.7 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	22.49 mg/L [static]
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]
96 Hr LC50 Pimephales promelas	22330-41160 µg/L [static]
96 Hr LC50 Lepomis macrochirus	70000-142000 µg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	29 mg/L
48 Hr EC50 Daphnia magna	8.76 - 15.6 mg/L [Static]
48 Hr EC50 Daphnia magna	10 mg/L

Hexane (110-54-3)

Test & Species

Conditions

96 Hr LC50 Pimephales promelas	2.1-2.98 mg/L [flow-through]
24 Hr EC50 Daphnia magna	>1000 mg/L

Persistence/Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

***** Section 13 - Disposal Considerations *****

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

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*** Section 14 - Transportation Information ***

Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Gasoline, motor fuel	86290-81-5	DOT regulated marine pollutant

DOT Information

Shipping Name: Gasoline

UN #: 1203 Hazard Class: 3 Packing Group: II

Placard:



*** Section 15 - Regulatory Information ***

Regulatory Information

A: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Toluene (108-88-3)

SARA 313: 1.0 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Xylenes (o-, m-, p- isomers) (1330-20-7)

SARA 313: 1.0 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Benzene, 1,2,4-trimethyl- (95-63-6)

SARA 313: 1.0 % de minimis concentration

Ethylbenzene (100-41-4)

SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Benzene (71-43-2)

SARA 313: 0.1 % de minimis concentration
CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

Safety Data Sheet

Material Name: Gasoline All Grades

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Hexane (110-54-3)

SARA 313: 1.0 % de minimis concentration

CERCLA: 5000 lb final RQ; 2270 kg final RQ

SARA Section 311/312 – Hazard Classes

Acute Health

X

Chronic Health

X

Fire

X

Sudden Release of Pressure

--

Reactive

--

Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Gasoline, motor fuel	86290-81-5	DOT regulated marine pollutant

State Regulations

Component Analysis - State

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

Component	CAS	CA	MA	MN	NJ	PA	RI
Gasoline, motor fuel	86290-81-5	No	No	No	No	Yes	No
Toluene	108-88-3	Yes	Yes	Yes	Yes	Yes	No
Butane	106-97-8	Yes	Yes	Yes	Yes	Yes	No
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	Yes	Yes	Yes	Yes	No
Benzene, 1,2,4-trimethyl-	95-63-6	No	Yes	Yes	Yes	Yes	No
Ethyl alcohol	64-17-5	Yes	Yes	Yes	Yes	Yes	No
Ethylbenzene	100-41-4	Yes	Yes	Yes	Yes	Yes	No
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	No
Hexane	110-54-3	No	Yes	Yes	Yes	Yes	No

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

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

WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

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Component Analysis - WHMIS IDL

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

Component	CAS #	Minimum Concentration
Toluene	108-88-3	1 %
Butane	106-97-8	1 %
Benzene, 1,2,4-trimethyl-	95-63-6	0.1 %
Ethyl alcohol	64-17-5	0.1 %
Ethylbenzene	100-41-4	0.1 %
Benzene	71-43-2	0.1 %
Hexane	110-54-3	1 %

Additional Regulatory Information

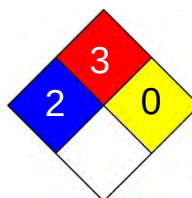
Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Gasoline, motor fuel	86290-81-5	No	DSL	EINECS
Toluene	108-88-3	Yes	DSL	EINECS
Butane	106-97-8	Yes	DSL	EINECS
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	DSL	EINECS
Benzene, 1,2,4-trimethyl-	95-63-6	Yes	DSL	EINECS
Ethyl alcohol	64-17-5	Yes	DSL	EINECS
Ethylbenzene	100-41-4	Yes	DSL	EINECS
Benzene	71-43-2	Yes	DSL	EINECS
Hexane	110-54-3	Yes	DSL	EINECS

*** Section 16 - Other Information ***

NFPA® Hazard Rating

Health	2
Fire	3
Reactivity	0



HMIS® Hazard Rating

Health	2	Moderate
Fire	3	Serious
Physical	0	Minimal

*Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Safety Data Sheet

Material Name: Gasoline All Grades

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Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

MATERIAL SAFETY DATA SHEET

ALCONOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations



SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **ALCONOX®**
CHEMICAL FAMILY NAME: Detergent.
PRODUCT USE: Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER: Not Applicable
U.N. DANGEROUS GOODS CLASS: Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME: Alconox, Inc.
ADDRESS: 30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE: **TOLL-FREE in USA/Canada** 800-255-3924
International calls 813-248-0585
BUSINESS PHONE: 914-948-4040
DATE OF PREPARATION: May 2011
DATE OF LAST REVISION: February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white granular powder with little or no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable solid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS

Non-Regulated

CANADA (WHMIS) SYMBOLS



EUROPEAN and (GHS) Hazard Symbols



Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1

EC# 205-633-8 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 231-838-7 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 231-767-1 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 207-638-8 Index# 011-005-00-2

EC# 205-788-1 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):

Eye Irritant Category 2A

Hazard Statement(s):

H319: Causes serious eye irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray

P264: Wash hands thoroughly after handling

P271: Use only in well ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection/

Hazard Symbol(s):

[Xi] Irritant

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Risk Phrases:

R20: Harmful by inhalation
R36/37/38: Irritating to eyes, respiratory system and skin

Safety Phrases:

S8: Keep container dry
S22: Do not breath dust
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS:

ACUTE: Eye, respiratory System, Skin

CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Sodium Bicarbonate	144-55-8	205-633-8	1044	33 - 43%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Tripolyphosphate	7758-29-4	231-838-7	1469	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tetrasodium Pyrophosphate	7722-88-5	231-767-1	1140	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Carbonate	497-19-8	207-638-8	1135	1 - 10%	HAZARD CLASSIFICATION: [Xi] Irritant RISK PHRASES: R36
Sodium Alcohol Sulfate	151-21-3	205-788-1	0502	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard JIS Z 7250: 2000.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing difficulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

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SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT:

Not Flammable

AUTOIGNITION TEMPERATURE:

Not Applicable

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): NA Upper (UEL): NA

FIRE EXTINGUISHING MATERIALS:

As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

This product is non-flammable and has no known explosion hazards.

Explosion Sensitivity to Mechanical Impact:

Not Sensitive.

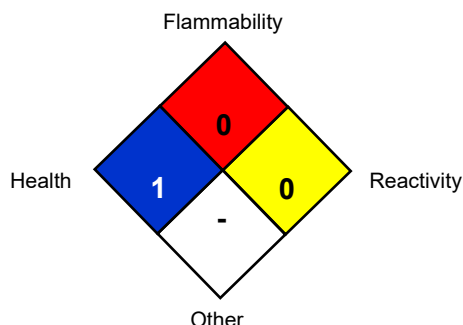
Explosion Sensitivity to Static Discharge:

Not Sensitive

SPECIAL FIRE-FIGHTING PROCEDURES:

Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD (BLUE)			1
FLAMMABILITY HAZARD (RED)			0
PHYSICAL HAZARD (YELLOW)			0
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8
For Routine Industrial Use and Handling Applications			

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

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.

SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Sweep, shovel or vacuum spilled material and place in an appropriate container for re-use or disposal. Avoid dust generation if possible. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

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SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Sodium Bicarbonate	144-55-8	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium Tripolyphosphate	7758-29-4	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Tetrasodium Pyrophosphate	7722-88-5	5 mg/m ³	5 mg/m ³	5 mg/m ³
Sodium Carbonate	497-19-8	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium Alcohol Sulfate	151-21-3	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Based on test data, exposure limits should not be exceeded under normal use conditions when using Alconox Detergent. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

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

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
APPEARANCE & ODOR:	White granular powder with little or no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	Not Applicable
VAPOR DENSITY (AIR=1):	Not Applicable.
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Applicable.
BOILING POINT (C°):	Not Applicable.
FREEZING POINT (C°):	Not Applicable.
pH:	9.5 (1% aqueous solution)
SPECIFIC GRAVITY 20°C: (WATER =1)	0.85 – 1.1
SOLUBILITY IN WATER (%)	>10% w/w
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

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SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable

DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx)

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials and dust generation.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is available for mixture:

CAS# 497-19-8 LD50 Oral (Rat)	4090 mg/kg
CAS# 497-19-8 LD50 Oral (Mouse)	6600 mg/kg
CAS# 497-19-8 LC50 Inhalation (Rat)	2300 mg/m ³ 2H
CAS# 497-19-8 LC50 Inhalation (Mouse)	1200 mg/m ³ 2H
CAS# 7758-29-4 LD50 Oral (Rat)	3120 mg/kg
CAS# 7758-29-4 LD50 Oral (Mouse)	3100 mg/kg
CAS# 7722-88-5 LD50 Oral (Rat)	4000 mg/kg

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.

SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: No Data available at this time.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Non-Regulated Material

HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable

UN IDENTIFICATION NUMBER: Not Applicable

PACKING GROUP: Not Applicable.

DOT LABEL(S) REQUIRED: Not Applicable

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable

MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:

This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:

This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):

This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:

This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

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This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: Yes Chronic Health: No Fire: No Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Controlled Product, Hazard Class D2B as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftlist List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

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Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF ALCONOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDA certified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-inplace. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.

Section 1: IDENTIFICATION**Product Name:** Simple Green® All-Purpose Cleaner**Additional Names:****Manufacturer's Part Number:** **Please refer to Section 16***Recommended Use:** Cleaner & Degreaser for water tolerant surfaces.**Restrictions on Use:** Do not use on non-rinsable surfaces.**Company:** Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Beach, CA 92649 USA**Telephone:** 800-228-0709 • 562-795-6000 *Mon – Fri, 8am – 5pm PST***Fax:** 562-592-3830**Email:** info@simplegreen.com**Emergency Phone:** Chem-Tel 24-Hour Emergency Service: 800-255-3924**Section 2: HAZARDS IDENTIFICATION****This product is not classified as hazardous under 2012 OSHA Hazard Communication Standards (29 CFR 1910.1200).**OSHA HCS 2012Label Elements**Signal Word:** None**Hazard Symbol(s)/Pictogram(s):** None required**Hazard Statements:** None**Precautionary Statements:** None**Hazards Not Otherwise Classified (HNOC):** None**Other Information:** None Known**Section 3: COMPOSITION/INFORMATION ON INGREDIENTS**

<u>Ingredient</u>	<u>CAS Number</u>	<u>Percent Range</u>
Water	7732-18-5	> 84.8%*
Ethoxylated Alcohol	68439-46-3	< 5%*
Sodium Citrate	68-04-2	< 5%*
Tetrasodium <i>N,N</i> -bis(carboxymethyl)-L-glutamate	51981-21-6	< 1%*
Sodium Carbonate	497-19-8	< 1%*
Citric Acid	77-92-9	< 1%*
Isothiazolinone mixture	55965-84-9	< 0.2%*
Fragrance	Proprietary Mixture	< 1%*
Colorant	Proprietary Mixture	< 1%*

specific percentages of composition are being withheld as a trade secret*Section 4: FIRST-AID MEASURES****Inhalation:** Not expected to cause respiratory irritation. If adverse effect occurs, move to fresh air.**Skin Contact:** Not expected to cause skin irritation. If adverse effect occurs, rinse skin with water.**Eye Contact:** Not expected to cause eye irritation. If adverse effect occurs, flush eyes with water.**Ingestion:** May cause upset stomach. Drink plenty of water to dilute. See section 11.**Most Important Symptoms/Effects, Acute and Delayed:** None known.**Indication of Immediate Medical Attention and Special Treatment Needed, if necessary:** Treat symptomatically

Section 5: FIRE-FIGHTING MEASURES

Suitable & Unsuitable Extinguishing Media: Use Dry chemical, CO₂, water spray or “alcohol” foam. Avoid high volume jet water.
Specific Hazards Arising from Chemical: In event of fire, fire created carbon oxides may be formed.
Special Protective Actions for Fire-Fighters: Wear positive pressure self-contained breathing apparatus; Wear full protective clothing.

This product is non-flammable. See Section 9 for Physical Properties.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: *For non-emergency and emergency personnel:* See section 8 – personal protection. Avoid eye contact. Safety goggles suggested.

Environmental Precautions: Do not allow into open waterways and ground water systems.

Methods and Materials for Containment and Clean Up: Dike or soak up with inert absorbent material. See section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Precautions for Safe Handling: Ensure adequate ventilation. Keep out of reach of children. Keep away from heat, sparks, open flame and direct sunlight. Do not pierce any part of the container. Do not mix or contaminate with any other chemical. Do not eat, drink or smoke while using this product.

Conditions for Safe Storage including Incompatibilities: Keep container tightly closed. Keep in cool dry area. Avoid prolonged exposure to sunlight. Do not store at temperatures above 109°F (42.7°C). If separation occurs, mix the product for reconstitution.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limit Values: No components listed with TWA or STEL values under OSHA or ACGIH.

Appropriate Engineering Controls: Showers, eyewash stations, ventilation systems

Individual Protection Measures / Personal Protective Equipment (PPE)

Eye Contact: Use protective glasses or safety goggles if splashing or spray-back is likely.
Respiratory: Use in well ventilated areas or local exhaust ventilations when cleaning small spaces.
Skin Contact: Use protective gloves (any material) when used for prolonged periods or dermally sensitive.
General Hygiene Considerations: Wash thoroughly after handling and before eating or drinking.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Green Liquid	Partition Coefficient: n-octanol/water:	Not determined
Odor:	Added sassafras odor	Autoignition Temperature:	Non-flammable
Odor Threshold:	Not determined	Decomposition Temperature:	109°F
pH ASTM D-1293:	8.5 – 9.5	Viscosity:	Like water
Freezing Point ASTM D-1177:	0-3.33°C (32-38°F)	Specific Gravity ASTM D-891:	1.01 – 1.03
Boiling Point & Range ASTM D-1120:	101°C (213.8°F)	VOCs:	<i>**Water & fragrance exemption in calculation</i>
Flash Point ASTM D-93:	> 212°F	SCAQMD 304-91 / EPA 24:	0 g/L 0 lb/gal 0%
Evaporation Rate ASTM D-1901:	¼ Butyl Acetate @ 25°C	CARB Method 310**:	2.5 g/L 0.021 lb/gal 0.25%
Flammability (solid, gas):	Not applicable	SCAQMD Method 313:	Not tested
Upper/Lower Flammability or Explosive Limits:	Not applicable	VOC Composite Partial Pressure:	Not determined
Vapor Pressure ASTM D-323:	0.60 PSI @ 77°F, 2.05 PSI @ 100°F	Relative Density ASTM D-4017:	8.34 – 8.42 lb/gal
Vapor Density:	Not determined	Solubility:	100% in water

Section 10: STABILITY AND REACTIVITY

Reactivity:	Non-reactive.
Chemical Stability:	Stable under normal conditions 70°F (21°C) and 14.7 psig (760 mmHg).
Possibility of Hazardous Reactions:	None known.
Conditions to Avoid:	Excessive heat or cold.
Incompatible Materials:	Do not mix with oxidizers, acids, bathroom cleaners, or disinfecting agents.
Hazardous Decomposition Products:	Normal products of combustion - CO, CO ₂ .

Section 11: TOXICOLOGICAL INFORMATION

Likely Routes of Exposure:	Inhalation -	Overexposure may cause headache.
	Skin Contact -	Not expected to cause irritation, repeated contact may cause dry skin.
	Eye Contact -	Not expected to cause irritation.
	Ingestion -	May cause upset stomach.

Symptoms related to the physical, chemical and toxicological characteristics: no symptoms expected under typical use conditions.

Delayed and immediate effects and or chronic effects from short term exposure: no symptoms expected under typical use conditions.

Delayed and immediate effects and or chronic effects from long term exposure: headache, dry skin, or skin irritation may occur.

Interactive effects: Not known.

Numerical Measures of Toxicity

Acute Toxicity:	Oral LD ₅₀ (rat)	> 5 g/kg body weight
	Dermal LD ₅₀ (rabbit)	> 5 g/kg body weight

Calculated via OSHA HCS 2012 / Globally Harmonized System of Classification and Labelling of Chemicals

Skin Corrosion/Irritation:	Non-irritant per Dermal Irritation® assay modeling. No animal testing performed.
Eye Damage/Irritation:	Minimal irritant per Ocular Irritation® assay modeling. No animal testing performed.
Germ Cell Mutagenicity:	Mixture does not classify under this category.
Carcinogenicity:	Mixture does not classify under this category.
Reproductive Toxicity:	Mixture does not classify under this category.
STOT-Single Exposure:	Mixture does not classify under this category.
STOT-Repeated Exposure:	Mixture does not classify under this category.
Aspiration Hazard:	Mixture does not classify under this category.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity:	Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Aquatic:	Aquatic Toxicity - Low, based on OECD 201, 202, 203 + Microtox: EC ₅₀ & IC ₅₀ ≥100 mg/L. Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Terrestrial:	Not tested on finished formulation.
Persistence and Degradability:	Readily Biodegradable per OCED 301D, Closed Bottle Test
Bioaccumulative Potential:	No data available.
Mobility in Soil:	No data available.
Other Adverse Effects:	No data available.

Section 13: DISPOSAL CONSIDERATIONS

Unused or Used Liquid: May be considered hazardous in your area depending on usage and tonnage of disposal – check with local, regional, and or national regulations for appropriate methods of disposal.

Empty Containers: May be offered for recycling.

Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

Section 14: TRANSPORT INFORMATION

U.N. Number: Not applicable
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Marine Pollutant - NO
U.N. Proper Shipping Name: Cleaning Compound, Liquid NOI
NMFC Number: 48580-3
Class: 55
Transport in Bulk (according to Annex II of MARPOL 73/78 and IBC Code): Unknown.
Special precautions which user needs to be aware of/comply with, in connection with transport or conveyance either within or outside their premises: None known.

U.S. (DOT) / Canadian TDG: Not Regulated for shipping.
IMO / IDMG: Not classified as Hazardous
ICAO/ IATA: Not classified as Hazardous
ADR/RID: Not classified as Hazardous

Section 15: REGULATORY INFORMATION

All components are listed on: TSCA and DSL Inventory.

SARA Title III: Sections 311/312 Hazard Categories – Not applicable.
 Sections 313 Superfunds Amendments and Reauthorizations Act of 1986 – Not applicable.
 Sections 302 – Not applicable.

Clean Air Act (CAA): Not applicable

Clean Water Act (CWA): Not applicable

State Right To Know Lists: No ingredients listed

California Proposition 65: No ingredients listed

Texas ESL:

Ethoxylated Alcohol	68439-46-3	60 µg/m ³ long term	600 µg/m ³ short term
Sodium Citrate	68-04-2	5 µg/m ³ long term	50 µg/m ³ short term
Sodium Carbonate	497-19-8	5 µg/m ³ long term	50 µg/m ³ short term
Citric Acid	77-92-9	10 µg/m ³ long term	100 µg/m ³ short term

Section 16: OTHER INFORMATION

<u>Size</u>	<u>UPC</u>	<u>Size</u>	<u>UPC</u>
2 oz. Pump	043318130366	1 Gallon w/ Dilution Bottle	043318000669
2 oz. Pump	043318131035	1 Gallon	043318000799
4 oz. Pump	043318130014	1 Gallon w/ Dilution Bottle	043318001383
16 oz. Trigger	043318130021	1 Gallon w/ Dilution Bottle	043318002021
22 oz. Trigger	043318130229	1 Gallon	043318130052
24 oz. Trigger, 12 per case	043318000034	1 Gallon w/ Dilution Bottle, 112 per case	043318480140
24 oz. Trigger	043318000300	1 Gallon w/ Dilution Bottle, 4 per case	043318480416
24 oz. Trigger	043318130137	1 Gallon w/ Dilution Bottle, 24 per case	043318480492
32 oz. Trigger	043318000652	1 Gallon w/ laundry	043318002052
32 oz. Trigger	043318130335	1 Gallon w/ towel	043318001222
67.6 oz.	043318000393	140 oz.	043318001390
67.6 oz.	043318130144	140 oz., 168 per case	043318561405
1 Gallon w/ Dilution Bottle	043318000539	140 oz. w/ Dilution Bottle	043318001468
1 Gallon w/ Dilution Bottle	043318000645		

USA items listed only. Not all items listed. USA items may not be valid for international sale.

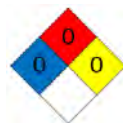
Section 16: OTHER INFORMATION - continued**NFPA:**

Health – None

Flammability – Non-flammable

Stability – Stable

Special - None

**Acronyms**

NTP National Toxicology Program

OSHA Occupational Safety and Health Administration

TSCA Toxic Substances Control Act

IARC

CPSC

DSL

International Agency for Research on Cancer

Consumer Product Safety Commission

Domestic Substances List

Prepared / Revised By: Sunshine Makers, Inc., Regulatory Department.**This SDS has been revised in the following sections:** Revised SDS layout

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 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.

SAFETY DATA SHEET

Hydrogen Chloride

Section 1. Identification

GHS product identifier	: Hydrogen Chloride
Chemical name	: Hydrogen chloride
Other means of identification	:
Product use	: Synthetic/Analytical chemistry.
Synonym	:
SDS #	: 001028
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	: GASES UNDER PRESSURE - Compressed gas ACUTE TOXICITY (inhalation) - Category 3 SKIN CORROSION/IRRITATION - Category 1 SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1 SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

GHS label elements

Hazard pictograms



Signal word : Danger

Hazard statements : Contains gas under pressure; may explode if heated.
Toxic if inhaled.
Causes severe skin burns and eye damage.
Causes serious eye damage.
May cause respiratory irritation.

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.

Prevention

: Wear protective gloves. Wear eye or face protection. Wear protective clothing. Use only outdoors or in a well-ventilated area. Avoid breathing gas. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response	: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.
Storage	: Store locked up. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
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	: Hydrogen chloride
Other means of identification	:

CAS number/other identifiers

CAS number	: 7647-01-0
Product code	: 001028

Ingredient name	%	CAS number
hydrogen chloride	100	7647-01-0

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	: Get medical attention immediately. Call a poison center or physician. 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. Chemical burns must be treated promptly by a physician.
Inhalation	: Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. 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. 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	: Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. 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

Section 4. First aid measures

- Eye contact** : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite.
- Inhalation** : Toxic if inhaled. May cause respiratory irritation.
- Skin contact** : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.
- 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** : Adverse symptoms may include the following: pain, watering, redness
- Inhalation** : Adverse symptoms may include the following: respiratory tract irritation, coughing
- Skin contact** : Adverse symptoms may include the following: pain or irritation, redness, blistering may occur
- Ingestion** : Adverse symptoms may include the following: stomach pains

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.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

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. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials: halogenated compounds

- 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.

- 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** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Section 6. Accidental release measures

- 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.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. 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. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. 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). Store locked up. 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
hydrogen chloride	ACGIH TLV (United States, 3/2015). C: 2 ppm NIOSH REL (United States, 10/2013). CEIL: 7 mg/m ³ CEIL: 5 ppm OSHA PEL (United States, 2/2013). CEIL: 7 mg/m ³ CEIL: 5 ppm OSHA PEL 1989 (United States, 3/1989). CEIL: 7 mg/m ³ CEIL: 5 ppm

- 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.

Section 8. Exposure controls/personal protection

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: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.
- Skin 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.
- 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. Yellowish.
- Molecular weight** : 36.46 g/mole
- Molecular formula** : Cl-H
- Boiling/condensation point** : -85°C (-121°F)
- Melting/freezing point** : -114°C (-173.2°F)
- Critical temperature** : 51.45°C (124.6°F)
- Odor** : Pungent.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : [Product does not sustain combustion.]
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.

Section 9. Physical and chemical properties

Vapor pressure	: 613 (psig)
Vapor density	: 1.3 (Air = 1)
Specific Volume (ft ³/lb)	: 10.5263
Gas Density (lb/ft ³)	: 0.095
Relative density	: Not applicable.
Solubility	: Soluble in the following materials: cold water.
Solubility in water	: Not available.
Partition coefficient: n-octanol/water	: 0.25
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
SADT	: Not available.
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	: No specific data.
Incompatible materials	: No specific data.
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
hydrogen chloride	LC50 Inhalation Gas.	Rat	3124 ppm	1 hours
	LC50 Inhalation Gas.	Rat	1562 ppm	4 hours

IDLH : 50 ppm

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
hydrogen chloride	Eyes - Mild irritant	Rabbit	-	0.5 minutes 5 milligrams	-
	Skin - Mild irritant	Human	-	24 hours 4 Percent	-

Sensitization

Not available.

Mutagenicity

Not available.

Section 11. Toxicological information

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
hydrogen chloride	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
hydrogen chloride	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

- Eye contact** : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite.
- Inhalation** : Toxic if inhaled. May cause respiratory irritation.
- Skin contact** : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.
- Ingestion** : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following: pain, watering, redness
- Inhalation** : Adverse symptoms may include the following: respiratory tract irritation, coughing
- Skin contact** : Adverse symptoms may include the following: pain or irritation, redness, blistering may occur
- Ingestion** : Adverse symptoms may include the following: stomach pains

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.

Section 11. Toxicological information

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

Product/ingredient name	Result	Species	Exposure
hydrogen chloride	Acute LC50 240000 µg/l Marine water	Crustaceans - Carcinus maenas - Adult	48 hours
	Acute LC50 282 ppm Fresh water	Fish - Gambusia affinis - Adult	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
hydrogen chloride	0.25	-	low

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

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1050	UN1050	UN1050	UN1050	UN1050
UN proper shipping name	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS
Transport hazard class(es)	2.3 (8) 	2.3 (8) 	2.3 (8) 	2.3 (8) 	2.3 (8) 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	Inhalation hazard zone C Reportable quantity 5000 lbs / 2270 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. Limited quantity Yes. Packaging instruction Passenger aircraft Quantity limitation: Forbidden. Cargo aircraft Quantity limitation: Forbidden. Special provisions 3	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.40-2.42 (Class 8). Explosive Limit and Limited Quantity Index 0 ERAP Index 25 Passenger Carrying Ship Index Forbidden Passenger Carrying Road or Rail Index Forbidden Special provisions 38	-	-	Passenger and Cargo Aircraft Quantity limitation: 0 Forbidden Cargo Aircraft Only Quantity limitation: 0 Forbidden

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

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 Water Act (CWA) 311: Hydrogen chloride
Clean Air Act (CAA) 112 regulated toxic substances: Hydrogen chloride
Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Section 15. Regulatory information

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) : Listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
hydrogen chloride	100	Yes.	500	-	5000	-

SARA 304 RQ : 5000 lbs / 2270 kg

SARA 311/312

Classification : Sudden release of pressure
Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
hydrogen chloride	100	No.	Yes.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Hydrogen chloride	7647-01-0	100
Supplier notification	Hydrogen chloride	7647-01-0	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is 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 : This material is listed or exempted.

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.

Section 15. Regulatory information

Canada

WHMIS (Canada)

: Class A: Compressed gas.
 Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
 Class E: Corrosive material
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 D-1A: Material causing immediate and serious toxic effects (Very toxic).
 Class E: Corrosive material

Hazardous Material Information System (U.S.A.)

Health	3
Flammability	0
Physical hazards	3

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.)



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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
Press. Gas Comp. Gas, H280 Acute Tox. 3, H331 Skin Corr. 1, H314 Eye Dam. 1, H318 STOT SE 3, H335	According to package On basis of test data Expert judgment Expert judgment Expert judgment

History

Date of printing : 6/24/2016
Date of issue/Date of revision : 6/24/2016

Section 16. Other information

Date of previous issue : No previous validation

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

SECTION 1:**PRODUCT AND COMPANY IDENTIFICATION**

Hydrochloric Acid, 31 – 36%

Product Name: Hydrochloric Acid, 31 – 36.7%

Identified Uses: acid etching, steel pickling, oil and gas, ore and mineral, food processing, pharmaceutical, organic chemical synthesis

Company Information:

ASHTA Chemicals Inc.

P.O. Box 858

Ashtabula Ohio 44005

Phone: (440) 997-5221

Fax: (440) 998-0286

24-hour Emergency Phone: CHEMTREC: (800) 424-9300

SECTION 2:**HAZARDS IDENTIFICATION**

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

GHS label elements, including precautionary statements:

Signal Word: **Danger**

Pictogram(s):

**Hazard Statements**

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

Precautionary Statements

P234	Keep only in original container.
P261	Avoid breathing dust/ fume/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
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): Remove/Take off immediately all contaminated clothing. Rinse skin with water. Shower.

P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container with a resistant inner liner.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/ container to an approved waste disposal plant.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms:

CHEMICAL NAME:	Hydrochloric acid
TRADE NAME:	Hydrochloric acid, 31 – 36%
SYNONYMS:	Muriatic acid, Chlorohydric acid, Hydrogen Chloride

C.A.S:	7647-01-0
EC:	231-595-7
WHMIS:	D2A, E

CHEMICAL FORMULA:	HCl (in aqueous solution)
CHEMICAL FAMILY:	Inorganic Acid

SECTION 4 FIRST AID MEASURES

Description of first aid measures:

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give humidified air. Give oxygen, but only by a certified physician. Consult a physician.

In case of skin contact

Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Remove contact lenses if present and easy to do. Continue rinsing eyes during transport to medical facility.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth thoroughly with water. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Consult a physician.



SECTION 5	FIRE FIGHTING MEASURES

Flash Point (Method):	Non-combustible.
Extinguishing Media:	Use extinguishing agents compatible with acid and appropriate for the burning material. Use water spray to keep fire-exposed containers cool.
Auto Ignition Temp:	Non-combustible.
Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and full protective clothing. In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials.
Unusual Fire/Explosion Hazards:	Releases flammable hydrogen gas when reacting with metals.

SECTION 6	ACCIDENTAL RELEASE MEASURES

Environmental Precautions:

Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Avoid discharge into drains, water courses or onto the ground.

Containment and Cleaning:

Follow preplanned emergency procedures. Only properly equipped, trained, functional personnel should attempt to contain a leak. All other personnel should be evacuated from the danger area. Using full protective equipment, apply appropriate emergency device or other securement technology to stop the leak if possible.

Small Spill:	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: neutralize the residue with a dilute solution of sodium carbonate.
Large Spill:	Corrosive liquid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to knock down vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that vapor is not present at a concentration level above TLV.

SECTION 7:	HANDLING AND STORAGE

Precautions to be taken for handling and storage:

Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Do not breathe mist or vapor. Observe good industrial hygiene practices. Do not empty into drains. Use caution when combining with water; DO NOT add water to acid, ALWAYS add acid to water while stirring to prevent release of heat, steam and fumes. Store in a well-ventilated place. Store away from incompatible materials. Store closed containers in a clean, cool, open or well ventilated area. Keep out of sun.

SECTION 8: EXPOSURE CONTROL/PERSONAL PROTECTION

Principal Component: Hydrochloric Acid

Occupational Exposure Limits:

Regulatory Limits:

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrochloric Acid Mixture	---	---	5 ppm 7.59 mg/m ³

ACGIH TLV = 5 ppm (7.59 mg/m³) TWA

NIOSH IDLH = 50 ppm (as HCl, 2010)

Exposure Controls:

Eye Protection:

Tightly fitting safety goggles. Face shield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Respiratory Protection:

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

Other Protection:

Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Ventilation Recommended:

Exhaust ventilation is required to meet PEL limits.

Glove Type Recommended:

Wear neoprene, nitrile, butyl rubber or PVC gloves to prevent exposure.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

Appearance	Colorless to light yellow liquid
Odor	Pungent (irritating/strong)
Odor Threshold	0.3ppm (can cause olfactory fatigue)
pH	<1 (in aqueous solution)
Melting point/freezing point	-30°C (-22°F)
Initial boiling point	>100°C (>212°F)
Flash point	Not applicable
Auto-ignition Temp	Not applicable
Evaporation rate	No data available



Decomposition temperature	No data available
Flammability (solid, gas)	Not combustible
Upper/lower flammability or explosive limits	Not combustible
Water solubility	100%
Molecular Weight	36.46
Relative Density (Specific Gravity)	1.16 (32% HCl solution) 1.19 (36.5% HCl solution)
Bulk Density	8.75 lbs/gal (32% HCl solution) 9.83 lbs/gal (36.5% HCl solution)
Vapor Density (air = 1)	1.267 at 20 °C
Vapor Pressure	84 mm Hg @ 20°C
Partition Coefficient: n-octanol/water	No data available

SECTION 10:	STABILITY AND REACTIVITY

Stability:	Hydrochloric acid is stable under normal conditions and pressures.
Conditions to avoid:	Incompatible materials, metals, excess heat, bases.
Incompatibility:	Bases, amines, metals, permanganates, (e.g. potassium permanganate), fluorine, metal acetylides, hexalithium disilicide.
Hazardous decomposition products:	Hydrogen chloride, chlorine, hydrogen gas.
Polymerization:	Hazardous polymerization WILL NOT occur.

SECTION 11:	TOXICOLOGICAL INFORMATION

Information on likely routes of exposure:

Inhalation:	Vapors and mist will irritate throat and respiratory system and cause coughing.
Skin contact:	Causes skin burns.
Eye contact:	Causes eye burns.
Ingestion:	Harmful if swallowed. Causes digestive tract burns. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.

Symptoms related to the physical, chemical and toxicological characteristics:

Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects:

Acute toxicity:	Harmful if swallowed.
Skin corrosion/irritation:	Causes severe skin burns and eye damage.
Serious eye damage/eye	
Irritation:	Causes serious eye damage.
Respiratory sensitization:	Not available.



Skin sensitization:	No data available.
Germ cell mutagenicity:	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity:	This product is not considered to be a carcinogen by IARC, ACGIH, NTP or OSHA.
Reproductive toxicity:	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure:	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure:	No data available.
Aspiration hazard:	Not available.
Chronic effects:	Prolonged inhalation may be harmful.

Components Species Test Results:

Hydrochloric acid (CAS# 7647-01-0)

Rat - Inhalation LC ₅₀ :	3124 ppm, (1 hour)
Rabbit - Dermal LD ₅₀ :	5010 mg/kg

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity:	Because of the low pH of this product, it would be expected produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.
Aquatic Toxicity:	This material is toxic to fish and aquatic organisms. Most aquatic species do not tolerate pH lower than 5.5 for any extended period.
Fish Toxicity:	Fish LC ₅₀ Mosquito fish: 282 mg/l, 96 hours Fish LC ₅₀ Bluegill: 3.6 mg/l, 48 hours
Persistence and degradability:	Not biodegradable. Hydrochloric acid will likely be neutralized to chloride by alkalinity present in natural environment..
Bioaccumulative Potential:	No data available.
Mobility in soil:	Hydrochloric acid will be neutralized by naturally occurring alkalinity. The acid will permeate soil, dissolving some soil material and will then neutralize.
Other adverse effects:	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation

SECTION 13: DISPOSAL CONSIDERATIONS

Collect and reclaim or dispose in sealed containers at a properly licensed waste disposal site. This material , if not neutralized, must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national or international regulations.



SECTION 14:	TRANSPORT INFORMATION

Shipping:

Usual Shipping Containers:	Tank cars, bulk tankers.
Usual Shelf Life:	Indefinite (life of containers).
Storage/Transport Temperatures:	Ambient.

Suitable Storage:

Materials/Coatings:	Teflon, Tygon, Rubber, PVC and polypropylene materials.

D.O.T. Information:

Labeling:	Corrosive
D.O.T. Identification Number	UN 1789
D.O.T. Shipping Name:	Hydrochloric Acid
Hazard Class:	8
Packing Group:	II
Hazard Guide:	157
Placard:	UN 1789

SECTION 15	REGULATORY INFORMATION

SARA 302 Components

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

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

Hydrochloric Acid	CAS#: 7647-01-0

SARA 311/312 Hazards

Acute health hazard, reactive hazard.

Massachusetts Right To Know Components

Hydrochloric Acid	CAS#: 7647-01-0

Pennsylvania Right To Know Components

Hydrochloric Acid	CAS#: 7647-01-0

New Jersey Right To Know Components

Hydrochloric Acid	CAS#: 7647-01-0

California Prop. 65 Components

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

OSHA PSM/RMP Threshold for Accidental Release:

CAS# 7647-01-0 is regulated under OSHA PSM *only* if anhydrous HCl.

CAS# 7647-01-0 is regulated under EPA RMP *only* if $\geq 37\%$ HCl.



Toxic Substances Control Act (TSCA):

Hydrochloric Acid

CAS#: 7647-01-0

Comprehensive Environmental Response Compensation Liability Act: (CERCLA)

Hydrochloric Acid

CAS#: 7647-01-0

SECTION 16

OTHER INFORMATION

NFPA Rating:

Health hazard: 3

Fire Hazard: 0

Reactivity Hazard: 1

This information is drawn from recognized sources believed to be reliable. ASHTA Chemicals, Inc. Makes no guarantees or assumes any liability in connection with this information. The user should be aware of changing technology, research, regulations, and analytical procedures that may require changes herein. The above data is supplied upon the condition that persons will evaluate this information and then determine its suitability for their use. Only U.S.A regulations apply to the above.

Version 1.0	For the new GHS SDS Standard
Version 1.1	Graphics updated
Version 1.2	Title updated
Version 1.3	Section 9 changes
Version 1.4	Section 1, 15 changes

Revision Date: 12/31/2014
Revision Date: 3/9/2015
Revision Date: 6/2/2015
Revision Date: 7/30/2015
Revision Date: 4/15/2016



Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 12-Mar-2009

Revision Date 28-Nov-2016

Revision Number 5

1. Identification

Product Name Nitric acid (65 - 70%)

Cat No. : A198C-212, A200-212, A200-212LC, A200-500, A200-500LC, A200-612GAL, A200C-212, A200S-212, A200S-212LC, A200S-500, A200SI-212, A467-1, A467-2, A467-250, A467-500, A483-212; S719721

Synonyms Azotic acid; Engraver's acid; Aqua fortis

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company

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

Emergency Telephone Number

CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

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

Oxidizing liquids	Category 3
Corrosive to metals	Category 1
Skin Corrosion/Irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word

Danger

Hazard Statements

May intensify fire; oxidizer
May be corrosive to metals
Causes severe skin burns and eye damage
May cause respiratory irritation

**Precautionary Statements****Prevention**

Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep/Store away from clothing/ other combustible materials
Take any precaution to avoid mixing with combustibles
Keep only in original container

Response

Immediately call a POISON CENTER or doctor/physician

Inhalation

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

Skin

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

Eyes

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

Ingestion

IF SWALLOWED: Rinse mouth. DO NOT induce vomiting

Fire

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

Spills

Absorb spillage to prevent material damage

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed
Store in corrosive resistant polypropylene container with a resistant inliner
Store in a dry place

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
Nitric acid	7697-37-2	65 - 70
Water	7732-18-5	30 - 35

4. First-aid measures

General Advice

Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact

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

Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing before re-use. Call a physician immediately.
Inhalation	If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Remove from exposure, lie down. Call a physician immediately.
Ingestion	Do not induce vomiting. Never give anything by mouth to an unconscious person. Clean mouth with water. Call a physician immediately.
Most important symptoms/effects	Causes burns by all exposure routes. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO ₂ , dry chemical, dry sand, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Oxidizing Properties	Oxidizer
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes. Oxidizer: Contact with combustible/organic material may cause fire. May ignite combustibles (wood, paper, oil, clothing, etc.).

Hazardous Combustion Products

Nitrogen oxides (NO_x) Thermal decomposition can lead to release of irritating gases and vapors

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. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	0	0	OX

6. Accidental release measures

Personal Precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

Handling	Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not ingest. Do not breathe vapors or spray mist. Keep away from clothing and other combustible materials.
Storage	Keep containers tightly closed in a cool, well-ventilated place. Do not store near combustible materials.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Nitric acid	TWA: 2 ppm STEL: 4 ppm	(Vacated) TWA: 2 ppm (Vacated) TWA: 5 mg/m ³ (Vacated) STEL: 4 ppm (Vacated) STEL: 10 mg/m ³ TWA: 2 ppm TWA: 5 mg/m ³	IDLH: 25 ppm TWA: 2 ppm TWA: 5 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³
Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Nitric acid	TWA: 2 ppm TWA: 5.2 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³	TWA: 2 ppm TWA: 5 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³	TWA: 2 ppm STEL: 4 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

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

Engineering Measures	Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Tightly fitting safety goggles. Face-shield.
Skin and body protection	Long sleeved clothing.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Keep away from food, drink and animal feeding stuffs. When using, do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. For environmental protection remove and wash all contaminated protective equipment before re-use. Wear suitable gloves and eye/face protection.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear Colorless, Light yellow
Odor	Strong Acid
Odor Threshold	No information available
pH	< 1.0 (0.1M)
Melting Point/Range	-41 °C / -41.8 °F
Boiling Point/Range	Not applicable
Flash Point	Not applicable

Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	0.94 kPa (20°C)
Vapor Density	No information available
Specific Gravity	1.40
Solubility	miscible
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	HNO ₃
Molecular Weight	63.02

10. Stability and reactivity

Reactive Hazard	Yes
Stability	Oxidizer: Contact with combustible/organic material may cause fire.
Conditions to Avoid	Incompatible products. Combustible material. Excess heat. Exposure to air or moisture over prolonged periods.
Incompatible Materials	Combustible material, Strong bases, Reducing agents, Metals, Powdered metals, Organic materials, Aldehydes, Alcohols, Cyanides, Ammonia, Strong reducing agents
Hazardous Decomposition Products	Nitrogen oxides (NO _x), Thermal decomposition can lead to release of irritating gases and vapors
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Dermal LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Vapor LC50	Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Nitric acid	Not listed	Not listed	LC50 = 2500 ppm. (Rat) 1h
Water	-	Not listed	Not listed

Toxicologically Synergistic Products No information available

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

Irritation	Causes severe burns by all exposure routes
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Nitric acid	7697-37-2	Not listed	Not listed	Not listed	Not listed	Not listed
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	Respiratory system
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects, both acute and delayed	Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. Large amounts will affect pH and harm aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Nitric acid	Not listed	LC50: = 72 mg/L, 96h (Gambusia affinis)	Not listed	Not listed

Persistence and Degradability Miscible with water Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Nitric acid	-2.3

13. Disposal considerations

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

14. Transport information

DOT

UN-No UN2031
 Proper Shipping Name NITRIC ACID
 Hazard Class 8
 Subsidiary Hazard Class 5.1
 Packing Group II

TDG

UN-No UN2031
 Proper Shipping Name NITRIC ACID
 Hazard Class 8
 Subsidiary Hazard Class 5.1
 Packing Group II

IATA

UN-No UN2031
 Proper Shipping Name NITRIC ACID
 Hazard Class 8
 Subsidiary Hazard Class 5.1
 Packing Group II

IMDG/IMO

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Nitric acid	X	X	-	231-714-2	-		X	X	X	X	X
Water	X	X	-	231-791-2	-		X	-	X	X	X

Legend:

X - Listed

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

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

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

P - Indicates a commenced PMN substance

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

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

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

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

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

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Nitric acid	7697-37-2	65 - 70	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	Yes

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Nitric acid	X	1000 lb	-	-

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Nitric acid	-	TQ: 500 lb

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive

Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Nitric acid	1000 lb	1000 lb

California Proposition 65 This product does not contain any Proposition 65 chemicals**U.S. State Right-to-Know Regulations**

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Nitric acid	X	X	X	X	X
Water	-	-	X	-	-

U.S. Department of Transportation

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

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Nitric acid	2000 lb STQ

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

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

WHMIS Hazard Class

C Oxidizing materials
 E Corrosive material
 D2B Toxic materials

**16. Other information**

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

Disclaimer

The information provided 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

End of SDS

APPENDIX I QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

for the

**KERRY CHEMICAL SITE
NYSDEC SITE NO. 413001
HANCOCK, NEW YORK**

Prepared for

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
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ACRONYMS AND ABBREVIATIONS

ASP	Analytical Services Protocol
°C	degree centigrade
CLP	Contract Laboratory Program
COC	chain of custody
DUSR	Data Usability Summary Report
EDD	electronic data deliverable
ELAP	Environmental Laboratory Approval Program
FD	field duplicate
FSP	Field Sampling Plan
IDL	instrument detection limit
ITR	independent technical review
LCS	laboratory control sample (equivalent to MSB)
LCSD	laboratory control sample duplicate
MD	matrix duplicate
MDL	method detection limit
mg/L	milligrams per liter
MS	matrix spike
MSB	matrix spike blank (equivalent to LCS)
MSD	matrix spike duplicate
NEIC	National Enforcement Investigations Center
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PQO	Project Quality Objective
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	relative percent difference
SMP	Site Management Plan
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds
VTSR	validated time of sample receipt

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) provides an overview of quality assurance/quality control (QA/QC) procedures that are required for work at the Kerry Chemical Site under the direction of the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT/SITE DESCRIPTION

The scope of the project and a description of the site are provided in the Site Management Plan (SMP).

3.0 PROJECT RESPONSIBILITIES

The Owner or Owner's representative is responsible for verifying that the analytical laboratories adhere to the QA/QC requirements specified in this QAPP. All laboratories to be used for the work assignment shall hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. Copies of the applicable ELAP certifications for each laboratory to be used during the work assignment shall be made available upon request. Each laboratory maintains its own QA/QC program and employs the required staff to implement this program. The QA Officer for each laboratory is responsible for verifying that all sample analyses are performed in accordance the analytical methods, laboratory QA/QC procedures, and this QAPP.

All work of a substantive nature or identified as a deliverable will undergo an independent technical review (ITR) by experienced and qualified personnel. A written record of the review and resolution of the review findings will be maintained in the project files.

The ITR is used as a management tool to assess:

- Compliance with referenced standards;
- The potential for erroneous assumptions, data, calculations, methods, or conclusions;
- Compliance with the standard of professional practice;
- The basis of and compliance with input and design requirements, design criteria, and design calculations;
- That the appropriate detail/or and calculation checks (i.e., QC) and internal project team reviews have been performed;
- The soundness of the technical approach and results; and
- That the work was completed in compliance with the requirements of the Work Assignment.

4.0 PROJECT QUALITY OBJECTIVES

4.1 Background

Project quality objectives (PQOs), such as those described in the *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005), define the type, quantity, and quality of data that are needed to answer specific environmental questions and support proper environmental decisions. More specifically, the PQOs:

- Define the environmental problem;
- Identify target analytes/contaminants of concern and concentration levels;
- Establish the analytical techniques to be used (field-screening, on-site, and/or off-site);
- Establish the appropriate sampling techniques to be used;
- Establish project sampling/analytical measurement performance criteria (where applicable) for precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity; and
- Determine the number of samples needed for each analytical group/matrix/concentration level.

PQOs are provided in the SMP.

4.2 Project Quality Objectives For Chemical Data Measurement

The data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) will be measured (when applicable) from data collected from chemical analyses of samples collected during the work assignment.

4.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using analyses of matrix spike/matrix spike duplicate/matrix

duplicate (MS/MSD/MD) and field duplicate (FD) samples. These provide a measure not only of sampling precision, but also of analytical precision based on the reproducibility of the analytical results. Relative percent difference (RPD) is used to evaluate precision. RPD criteria for all analyses being performed as part of the work assignment are provided in the analytical procedures identified in this QAPP, where applicable.

4.2.2 Accuracy

Accuracy measures the analytical bias of a measurement system. Sources of measurement error may include the sampling process, field contamination, sample preservation and handling, sample matrix, and sample preparation and analysis techniques. Sampling accuracy may be assessed by evaluating the results of equipment rinsate blanks and trip blanks. These data help to assess the potential contamination contribution from various outside sources.

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. Accuracy can be estimated based on the recovery of spiked analytes in the MS/MSD and laboratory control samples (LCS) or matrix spike blanks (MSB). MS/MSD analyses, which will give an indication of matrix effects that may be affecting target analyte identification and quantitation, are also a good gauge of method efficiency. Accuracy criteria for all analyses being performed as part of the work assignment are provided in the analytical methods identified in this QAPP, where applicable.

4.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigation objectives. The sampling procedures, as described in the project SMP, have been selected with the goal of obtaining representative samples for the media of concern.

4.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. An objective for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, and sensitivity) because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that the analytical methods and procedures be explicitly followed.

4.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that were expected to be obtained under normal conditions. To meet project needs, it is important that appropriate QC procedures be maintained to verify that valid data are obtained. The completeness goal for data collected as part of the work assignment is 90%, unless otherwise specified. If this goal is not met, then NYSDEC will determine what, if any, further actions need to be taken.

4.2.6 Sensitivity

Sensitivity, as it pertains to analytical methods/instrumentation, is defined as the lowest concentration that can be distinguished from background noise. Sensitivity is measured by method detection limit (MDL) determinations, which are performed by laboratories for each analytical instrument, analyte and matrix following procedures specified in 40 CFR Part 136, Appendix B. The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Instrument detection limits (IDLs) are similar to MDLs although the analytical procedures used for IDL determinations do not include the preparation/extraction procedures that are used for MDL determinations and environmental sample analyses. Therefore, IDLs provide a measure of sensitivity under ideal conditions, and do not take into account effects of sample matrix and/or other factors that may affect sensitivity. MDLs (and/or IDLs) for the parameters to be analyzed will be provided by the laboratory.

5.0 SAMPLING LOCATIONS AND PROCEDURES

Proposed sampling locations and sampling procedures are provided in the SMP.

6.0 SAMPLE CUSTODY AND HOLDING TIMES

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this work assignment will follow the COC guidelines of National Enforcement Investigations Center (NEIC) Policies and Procedures, prepared by the NEIC of the USEPA Office of Enforcement.

6.1 Custody Definitions

- Chain-of-Custody Officer - The employee responsible for oversight of all COC activities is the Site Manager (or his/her designee).
- Under Custody - A sample is "Under Custody" if:
 - It is in one's possession, or
 - It is in one's view, after being in one's possession, or
 - It was in one's possession and one placed it under lock, or
 - It is in a designated secure area.

6.2 Responsibilities

The Site Manager will be responsible for monitoring all COC activities and for collecting legally admissible COC documentation for the permanent project file, and will perform the following tasks:

- Review sample labels or tags, closure tapes, and COC records.
- Train all field sampling personnel in the methodologies for carrying out COC activities and the proper use of all COC and record documents.
- Monitor the implementation of COC procedures.
- Submit copies of the completed COC records to the Project Chemist.

6.3 Chain-of-Custody

Chain-of-custody is initiated in the laboratory when the empty sample containers are shipped for use in the field. When the empty containers are received from the laboratory, they will be checked for any breach of custody including, but not limited to, incomplete COC records, broken COC seals, or any evidence of tampering. Filled sample containers will be returned to the laboratory using appropriate COC procedures. Upon receipt of the samples, the laboratory sample custodian will check for any breach of custody. The Laboratory Project Manager shall notify the responsible parties immediately if there are any problems with the COC documentation.

6.4 Sample Containers and Holding Times

Sample container and preservation requirements and analytical holding times for the analytical methods being used for the work assignment are provided in the SMP. All holding times begin with the date/time of sample collection. The validated time of sample receipt (VTSR) is when samples are received at the laboratory.

7.0 ANALYTICAL PROCEDURES

The specific analytical methods to be used for the analysis of samples collected, and the quality control criteria to be followed by each laboratory when performing the analyses, are identified in the SMP.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing and analysis procedures, laboratory and field instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

8.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from sources traceable to National Institute of Standards and Technology, or other reliable commercial sources to ensure the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished as per the methods referenced in the SMP or on Table 1 in the Field Activity Plan. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well-documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two American Society of Testing Materials Class 1 weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges ($4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for refrigerators) shall be clearly posted on each unit in service.

Water Supply System – Laboratories performing water/solid/waste sample analyses must maintain a sufficient supply of analyte-free water for all project needs. The grade of the water must be of the highest quality in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses, and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis by the laboratory.

Air Supply System – Laboratories performing air/soil vapor sample analyses must maintain a sufficient supply of analyte-free air for all project needs. The grade of air must be of the highest quality in order to eliminate false-positives from the analytical results. Appropriate documentation of the quality of the air supply system(s) will be performed on a regular basis by the laboratory.

Sample Containers - All sample containers supplied by the laboratories shall meet the requirements of the analytical methods being used and/or the requirements specified in the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Pre-cleaned sample containers may be purchased by the laboratory and provided for sample collection as long as the containers meet the requirements of each analytical method and/or the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Documentation of sample cleaning procedures and/or certifications provided by vendors shall be maintained by the laboratories.

8.2 Laboratory Instruments

Calibration of laboratory instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet the project-required quantitation limits for each analytical method. Each instrument for organic analysis shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to the analytical methods required for the work assignment.

Calibration of an instrument must be performed prior to the analysis of any samples (initial calibration) and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still properly calibrated. If the contract laboratory cannot meet the method-required calibration requirements, corrective action shall be taken as discussed in Section 11.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the report case narrative, and submitted with the analytical results.

8.3 Field Instruments

Various types of portable instruments may be used in the field during this work assignment, which may include one or more of the following: multi-purpose meters capable of measuring pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, and/or temperature; photoionization detectors used to monitor organic vapors; and multi-gas meters and analyte-specific devices (e.g., Drager tubes/chips) for health and safety purposes. Other instruments may also be used as needed. The instruments expected to be used in the field during the work assignment are identified in the SMP. All calibration and maintenance of field instrumentation shall be performed according to the manufacturer's requirements, and shall be documented by the Site Manager.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect that sample matrix may have on data being generated. Two types of internal checks are performed - batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be determined by the analytical methods and any other requirements identified in the SMP. Acceptable criteria and/or target ranges for these QC samples are also identified in the SMP.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers to the analytical data, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples, including any project-specific QC samples, will be analyzed as discussed below.

9.1 Batch QC

Method Blanks - A method blank is defined as laboratory demonstrated analyte-free water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch or as required by the analytical methods. Concentrations of all analytes in the method blanks should be below the quantitation limits identified in the method. The Laboratory Project Manager shall contact the responsible parties to determine the appropriate course of action if analyte concentrations in any blank are greater than the quantitation limit.

Laboratory Control Samples (LCS) – An LCS (or MSB), is an aliquot of laboratory demonstrated analyte-free water spiked (fortified) with all, or a representative group, of the analytes being analyzed. The LCS (or MSB) recoveries and RPD are a measure of precision and accuracy that are used to verify that the analysis being performed is in control. LCS (or MSB) analyses shall be performed as required by the methods identified in the SMP. Acceptance criteria for LCS (or MSB) analyses are specified in the analytical methods.

9.2 Matrix-Specific QC

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples – MS/MSD samples consist of an aliquot of a sample that is spiked (fortified) with known concentrations of specific compounds as stipulated by the methodology. The MS/MSD samples are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery (%R) for each analyte and the RPD between the concentrations of each analyte in the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs samples will be collected and analyzed at the frequency of 5% of the total number of samples collected, or one per sampling event, whichever is less. Acceptance criteria for MS/MSD analyses are specified in the analytical method.

Matrix Duplicates (MD) - The matrix duplicate (MD) is a second aliquot of a sample that is prepared and analyzed in a manner identical to that used for the parent sample. Collection of matrix duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. A matrix duplicate may be performed instead of the matrix spike duplicate. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of soil samples, the analytical results are not always reproducible.

9.3 Additional QC

Additional QC samples that may be collected as part of the work assignment are described in this section. The specific number and type of QC samples to be collected are identified below.

Equipment/Rinsate Blanks – An equipment or rinsate blank is used to indicate potential contamination from sample instruments used to collect and transfer samples, and also serves as a measure of potential contamination from ambient sources during sample collection. When collecting water samples, the equipment blank is a sample of laboratory demonstrated analyte-free water passed over and/or through cleaned sampling equipment. The water must originate from one common source within the laboratory and must be the same water used by the laboratory when performing the analyses (i.e., for method blanks). Equipment blanks should be collected, transported, and analyzed in the same manner as the samples acquired that day. Equipment blanks typically are not required when using dedicated and/or disposable sampling equipment.

Field Blanks – A field blank is used to indicate potential contamination from sample collection containers and/or from ambient sources during sample collection. The field blank is collected by pouring laboratory demonstrated analyte-free water directly into clean sample collection containers. The water must originate from one common source within the laboratory and must be the same water used by the laboratory when performing the analyses (i.e., for method blanks). Field blanks should be collected, transported, and analyzed in the same manner as the samples acquired that day. Field blanks typically are collected only when ambient conditions may present a risk of contamination to field samples.

Trip Blanks - Trip blanks are only required when collecting aqueous samples for volatile organics or dissolved gas analyses. They are not required for non-aqueous matrices or for analysis of any other parameters. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. Trip blanks accompany the empty sample containers that are shipped from the laboratory into the field, and then back to the laboratory along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the laboratory with the same set of containers they accompanied to the field.

Field Duplicates – A field duplicate (FD) sample pair consists of two independent samples that are collected at approximately the same time and place, using the same collection methods. Both are containerized, handled, and analyzed in an identical manner. Field duplicates are useful in documenting the precision of the sampling process, and also provide a measure of analysis precision. Field duplicates are typically labeled so that the laboratory cannot determine or identify the location from which the field duplicate was collected. Field duplicates will be collected at a rate of 5%, or at least one per sampling event.

10.0 CALCULATION OF DATA QUALITY INDICATORS

10.1 Precision

Precision is evaluated using results from field or matrix duplicate, MS/MSD, and/or LCS/LCSD (MSB/MSBD) analyses. The RPD between the concentrations detected in the above-listed sample pairs is calculated using the following formula:

$$RPD = \left| \frac{(X_1 - X_2)}{[(X_1 + X_2) / 2]} \right| \times 100\%$$

where:

X_1 = Measured value of sample, MS, or LCS (MSB)

X_2 = Measured value of field (or matrix) duplicate, MSD, or LCSD (MSBD)

RPD criteria are provided by the laboratory per the analytical methods.

10.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. Analytical accuracy is expressed as the percent recovery (%R) of a compound or analyte that has been added to the environmental sample or laboratory demonstrated analyte-free matrix at known concentrations before analysis. Accuracy will be determined from MS, MSD, LCS (MSB) samples as well as from surrogate compounds that are added to samples prior to extraction and analysis (typically used for organic fractions only). Accuracy is calculated using the following formula:

$$\%R = \frac{(X_s - X_u)}{K} \times 100\%$$

where:

X_s - Measured value of the spike sample

X_u - Measured value of the unspiked sample

K - Known amount of spike in the sample

Accuracy criteria are provided by the laboratory per the analytical methods.

10.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\% \text{ Completeness} = \frac{(N - X_n)}{N} \times 100\%$$

where:

N - Number of valid measurements expected to be obtained

X_n - Number of invalid measurements

11.0 CORRECTIVE ACTIONS

The Site Manager will discuss with and receive approval from the NYSDEC or other responsible parties prior to taking any corrective actions in the field that may need to be implemented in order to meet project objectives. The Site Manager will document any corrective actions taken in the Field Log Book.

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

11.1 Incoming Samples

The laboratory shall document problems noted during sample receipt. The Laboratory Project Manager will contact the responsible parties as soon as possible if any problems are encountered. All corrective actions shall be documented thoroughly.

11.2 Sample Holding Times

If any sample extractions and/or analyses exceed method holding time requirements, the Laboratory Project Manager will contact the responsible parties immediately for problem resolution. All corrective actions shall be documented thoroughly.

11.3 Instrument Calibration

Sample analysis shall not be allowed until all laboratory instrumentation is properly calibrated in accordance with method requirements. If any initial/continuing calibration standards fail to meet the required criteria, recalibration must be performed and, if necessary, all samples going back to the previous acceptable continuing calibration standard must be reanalyzed.

11.4 Quantitation Limits

The laboratory must make every attempt to meet all quantitation limits required to meet TOGS 1.1.1 Class GA groundwater standards or guidance values. It should be noted that these

limits are based on undiluted samples analyses. Sample-specific quantitation limits may be affected by any dilution that is needed because of elevated analyte concentrations, and/or matrix interferences. If difficulties arise in achieving the required quantitation limits due to a particular sample matrix, the Laboratory Project Manager will contact the responsible parties for problem resolution. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory shall report results from both the initial analyses and secondary dilution analyses. Dilution should only be used to bring target analytes within the linear range of calibration. If samples are analyzed at a dilution with no target analytes detected, the Laboratory Project Manager shall contact the responsible parties so that appropriate corrective actions can be initiated.

11.5 Method QC

All QC samples, including blanks, matrix spikes, matrix spike duplicates, matrix duplicates, surrogate recoveries, laboratory control samples, and other method-specified QC samples, shall meet the acceptance criteria specified in the analytical method. Failure to these criteria will result in the possible qualification of all affected data. When the criteria are not met, the affected sample(s) should be reanalyzed within the required holding times to verify the presence or absence of matrix effects. It should be noted that reanalysis is not always required. The Laboratory Project Manager shall contact the responsible parties to discuss possible corrective actions should unusually difficult sample matrices be encountered. The laboratory shall follow the requirements of the analytical methods and any instructions provided by the responsible parties when determining if samples require reanalysis. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria as defined by the data validation guidelines identified in Section 12.2, or as otherwise identified for the work assignment.

11.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will be requested to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

12.0 DATA REDUCTION, VALIDATION, AND USABILITY

NYSDEC ASP Category B deliverable and EQuIS electronic data deliverable (EDD) requirements (or equivalent) will be required for documentation and reporting of all data. Where applicable, the standard NYSDEC Data Package Summary Forms should be completed by the analytical laboratories and included in the deliverable data packages.

12.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either graphic or printed tabular form. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Results for aqueous samples will be reported in concentration units of micrograms per liter ($\mu\text{g/L}$) or milligrams per liter (mg/L).

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or other reliable commercial sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

12.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use.

Data validation will be performed by the responsible party and/or an environmental chemist under his/her supervision. All analytical samples collected will receive a limited data review. This review will include a review of holding times, completeness of all required deliverables, review of QC results (blanks, instrument tunings, calibration standards, calibration verifications, surrogates recoveries, spike recoveries, replicate analyses, and laboratory controls) to determine if the data are within the protocol-required limits and specifications, a determination that all samples were analyzed using established and agreed upon analytical protocols, an evaluation of the raw data to confirm the results provided in the data summary sheets, and a review of laboratory data qualifiers. The methods identified in the SMP, as well as the general guidelines presented in the USEPA Region II documents, will be used to aid the chemist during the data review. The specific USEPA Region II validation guidelines to be followed will vary based on the

required analytical parameters for each work assignment, and will be documented in the Data Usability Summary Report (Section 12.3).

12.3 Data Usability

A Data Usability Summary Report (DUSR) (NYSDEC *DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B - Guidance for Data Deliverables and the Development of Data Usability Summary Reports*, May 2010) will be submitted to NYSDEC, and will describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems will be identified and their effect on the data will be discussed. The DUSR will also include recommendations on resampling/reanalysis.

13.0 PREVENTIVE MAINTENANCE

The laboratory is responsible for maintaining its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs will be available for inspection by auditing personnel.

Maintenance of field instrumentation will be performed as needed according to the manufacturer's requirements.

14.0 PERFORMANCE AND SYSTEMS AUDITS

Audits are evaluations of laboratory QA/QC procedures, and are performed before or shortly after systems are operational, and on an ongoing basis thereafter. Problems detected during these audits shall be reviewed by the Laboratory QA Manager and other laboratory management personnel, and corrective action shall be instituted as necessary.

14.1 Performance Audits

Performance audits are conducted by introducing control samples into the data measurement, reduction, and reporting processes. These control samples may include performance evaluation samples, or field samples spiked with known amounts of analytes. In addition to conducting internal reviews and performance audits as part of its established quality assurance program, the laboratory is required to take part in regularly-scheduled performance audits/evaluations from state and federal agencies. They are typically conducted as part of the certification process and to evaluate laboratory performance and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance, and to take appropriate corrective actions as needed.

14.2 Systems Audits

Systems audits are thorough, on-site qualitative audits of facilities, equipment/instrumentation, personnel, training procedures, record keeping, data review/management, and reporting aspects of a system. They provide a qualitative measure of the data produced by one section of, or the entire, measurement process. The audits are performed against a set of requirements, which may include laboratory standard operating procedures, a quality assurance project plan or work plan, a standard method, and/or a project statement of work. The primary objective of the systems audits is to verify that all procedures are being performed according to the requirements specified above. Systems audits are performed internally by the Laboratory QA Manager, and also by external parties such as state and federal regulatory agencies and private-sector clients. Typically, state and federal agencies perform systems audits in conjunction with performance audits/evaluations during the laboratory certification process. As part of its QA program, the Laboratory QA Manager shall also conduct periodic checks and audits

of the analytical, data reduction, and reporting systems. The purpose of these is to verify that the systems are operating properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits assist in determining or detecting where problems are occurring.

REFERENCES

- New York State Department of Environmental Conservation (NYSDEC), 2005. *Analytical Services Protocol*; July (or most current).
- NYSDEC, 2010. *DER-10, Technical Guidance for Site Investigation and Remediation*; May.
- United States Environmental Protection Agency (USEPA), National Enforcement Investigations Center (NEIC) Office of Enforcement, *NEIC Policies and Procedures*; Washington, D.C.
- USEPA, 2005. *Uniform Federal Policy for Quality Assurance Project Plans; Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs, Final, Version 1*; March.
- USEPA. 2014. *Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, SW-846 Method 8260B & 8260C, HW-24, Revision 4*; October (or most current).

APPENDIX J SITE MANAGEMENT FORMS

**KERRY CHEMICAL COMPANY SITE
NYSDEC SITE NO. 413001
SITE-WIDE INSPECTION FORM
(PAGE 1 of 2)**

GENERAL INFORMATION

Date:		Inspector:	
Weather:		Signature:	
Temperature:		Company:	
Season (circle one): Winter Spring Summer Fall			

SITE INSPECTION LOG SHEET

Evidence of Disturbance(s) (Y/N):		Description of Disturbance(s):*	
Evidence of Demolition (Y/N):		Description of Demolition:*	
Evidence of Building Construction (Y/N):		Description of Building Construction:*	
Evidence of site use change (Y/N):		Description of New/Additional Site Use:*	
Comments:			

* Attach map showing locations and any other information as required.

**KERRY CHEMICAL COMPANY SITE
NYSDEC SITE NO. 413001
SITE-WIDE INSPECTION FORM
(PAGE 2 of 2)**

WELL INSPECTION LOG SHEET (provide for each well inspected)

Well ID:		Time:		
Area	Item Inspected	Description of Condition (attach additional sheet if needed)	Additional Maintenance Needed?	Inspector's Initials
Exterior	Casing and collar		Yes / No	
	Well label		Yes / No	
	Lock and Cover		Yes / No	
Interior	Well cap		Yes / No	
	Well riser		Yes / No	
	Annular space		Yes / No	
Comments:				

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

KERRY CHEMICAL COMPANY SITE – POST CLOSURE

NYSDEC SITE NO. 4-13-001

INSPECTION LOG SHEET

Date: _____

Inspector: _____

Weather: _____

Signature: _____

Temperature: _____

Company: _____

Type: Winter Spring Summer Fall
(Circle One)

Item Inspected	Maintenance Needed (Y/N)	Comments	Inspector's Initials
Drainage Channel			
Groundwater Monitoring Wells			
Perimeter Access Road			
Vegetative Cover			
Repaired Vegetation			
Final Cover Layers (Cap Settlement, etc.)			
Gas Vents			
Fence and Gates			
Other Items: (Specify)			

Other Items: (Specify)			

SITE NAME: _____

JOB# _____

DATE: _____

TIME: _____

WELL ID: _____

EXTERIOR INSPECTION

PROTECTIVE CASING: _____

LOCK/HASP: _____

HINGE/LID: _____

WELL PAD: _____

BOLLARDS: _____

LABEL/ID: _____

OTHER: _____

INTERIOR INSPECTION

WELL RISER: _____

ANNULAR SPACE: _____

WELL CAP: _____

WATER LEVEL: _____

DEPTH TO BOTTOM: _____

OTHER: _____

COMMENTS: _____

Inspector's Name: _____

APPENDIX K FIELD ACTIVITIES PLAN



Environment

Prepared for:
Superfund Standby Program
NYSDEC
Albany, NY

Prepared by:
AECOM
Buffalo, NY
May 2022

Field Activities Plan (FAP)

SITE MANAGEMENT KERRY CHEMICAL SITE HANCOCK, NY

Prepared for:

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by:

AECOM USA, Inc.
One John James Audubon Parkway, Suite 210
Amherst, New York 14228

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Appendix A Field Activity Forms

1.0 Introduction

This Field Activities Plan (FAP) is designed to provide typical procedures for the field activities performed as part of Site Management at the Former Kerry Chemicals site. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with: (1) the Quality Assurance/ Quality Control (QA/QC) measures outlined in the Quality Assurance Project Plan (QAPP); (2) the appropriate Health and Safety guidelines found in the Health and Safety Plan (HASP); (3) the scope of work outlined in the Site Management Plan (SMP); and (4) the time schedule outlined in the SMP.

1.1 Work Assignment Objectives

The objectives of the work assignment are established in the SMP.

Field activities are planned and conducted in general accordance with NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010).

The FAP is intended to be a companion document to the site-specific SMP and included as an Appendix to the SMP to address site-specific conditions and project-specific requirements.

1.2 Site Description and Background Information

Available site information is presented in the Kerry Chemical SMP. Information to be presented in the SMP includes, but is not limited to, the following:

- Site Description
- Site Location
- Site History
- Previous Investigations, Remedial Actions, and Reports
- Record of Decision
- Current Site Conditions
- Local and Regional Geology and Hydrogeology
- Site Institutional and Engineering Controls

2.0 General and Preparatory Field Activities

The scope of work is established in the Kerry Chemicals SMP.

The SMP may include a variety of field activities intended to obtain site-specific data pertaining to the extent of contamination and the extent to which releases or potential releases from the site pose a threat to human health and the environment. Typical project objectives include:

- Assess site hydrogeology;
- Evaluate areal and vertical extent of contamination;
- Assess the source(s) of contamination and determine if this source(s) has impacted off-site properties; and
- Collect additional data to support the design and implementation of remedial actions.

To accomplish these objectives, the field subtasks described in this FAP may be utilized. Additional methodology information will be provided in the QAPP. Unless otherwise noted, it is assumed that all field work will be completed at Level D personal protection in accordance with the HASP. Field activities will be monitored by a qualified representative(s).

2.1 Mobilization

Following authorization to proceed with the field work from NYSDEC, the monitoring contractor will mobilize necessary materials and equipment to the site. If the project involves intrusive work (e.g., monitoring well installation, soil borings, test pits), a call will be placed to Dig Safely New York (811) and will be the responsibility of the subcontractor performing the intrusive work. Utility clearance is detailed in Section 2.3.

The SMP will describe the provisions made for providing all necessary facilities and material, independent of the site owners/occupants. For small work assignments and those of short duration, it may be possible to mobilize and store the necessary materials in a vehicle (e.g., cargo van). For larger projects, mobilization may include establishing a site trailer, temporary sanitary facilities and the construction of a temporary decontamination pad that will remain in place during the field effort. If appropriate to the project, a drum storage area will be established for the temporary storage of investigation derived waste, including soil cuttings, monitoring well development water, decontamination fluids and purge water from groundwater sampling. Soil cuttings may be temporarily stored in drums or roll-off containers.

A project kick-off meeting will be held prior to initiating field work to orient field team members and subcontractors with the site and to familiarize all site workers with site background, potential dangers, health and safety requirements and emergency contingencies and other field procedures.

2.2 Health and Safety

It is anticipated that the work to be completed at typical sites will be performed in Level D personal protection with the potential to upgrade to Level C. Field workers will be instructed to keep Level C equipment available should it be needed. Should health and safety monitoring during field activities indicate a threat to field personnel or warrant an upgrade beyond Level C protection, work will stop, and site conditions will be re-evaluated by NYSDEC and field personnel. An upgrade to Level B protection will require modification of the HASP and review by a regional safety manager.

The site-specific HASP will be submitted concurrently with the site-specific Work Plan, site-specific FAP, and site-specific QAPP.

2.3 Utility Clearance: Callout

Intrusive activities that may be conducted during a typical site investigation include soil borings, monitoring well installations, soil vapor sampling, and test pit excavations. Prior to the start of intrusive activities, a call will be placed to New York DIG SAFE CALL CENTER at Dig Safely New York (811) for utility markouts to minimize the risk of encountering subsurface utilities. Site personnel will be contacted to determine if detailed utility plans are available for the Site.

2.4 Geophysical Surveys

Geophysical surveys will be conducted to obtain information on subsurface conditions or features, in addition to locating utilities or obstructions, without intrusive work. The rationale, scope, and procedures for any geophysical surveys will be determined on a project-specific basis.

Seismic refraction, ground-penetrating radar and electromagnetic surveys are among the methods often utilized in site investigation. Descriptions of these survey methods are provided below.

Seismic Refraction

Seismic refraction techniques are used to determine the thickness and depth of geologic layers by measuring the travel time or velocity of seismic waves within the layers. Seismic waves are transmitted into the subsurface by a shock at the ground surface (i.e., a hydraulic hammer striking a metal plate). An array of geophones on the surface measures the travel time of the seismic waves from the source to the geophones at a number of pre-determined spacings. The time required for the wave to complete this path is measured, permitting a determination to be made of the subsurface features.

Ground-Penetrating Radar (GPR)

GPR utilizes high frequency radio waves to acquire subsurface information. From a small antenna, which is moved slowly across the ground surface, energy is radiated downward into the subsurface. This energy is then reflected back to the receiving antenna, where variations in the return signal are continuously recorded. This produces a continuous cross-section of the shallow subsurface

conditions. Radar responds well to the different electrical properties between rock units, soils, groundwater, and most importantly for this application, buried pipes, utilities, and foundations.

2.5 Utility Clearance: Vac-Tron®

Excavation with a Vac-Tron® unit allows for excavation near subsurface utilities with reduced chance of impacting the utilities.

Procedure:

1. Excavate a two-foot square by approximately five-foot deep area manually using post-hole diggers, pry bars, soil knives, and/or hand digging, along with the Vac-Tron® unit.
2. After the location is cleared for drilling, the hole will be backfilled flush with existing grade using the excavated spoils (small rocks and debris removed) and if necessary, temporarily patched with cold-mix asphalt or concrete.
3. Excavated material not returned to the hole will be drummed along with the monitoring well boring spoils for proper disposal.

2.6 Community Air Monitoring

Community air monitoring will be performed as outlined in the NYSDOH Generic Community Air Monitoring Plan (CAMP), unless it is determined by NYSDEC that a site-specific air monitoring plan is required, or that some of the provisions of the CAMP are not appropriate for a specific work assignment. The approach to implementing the Generic CAMP is provided in Section 9.0 of this FAP.

2.7 Site Survey

Project surveying will provide data necessary to plot groundwater monitoring wells, piezometers, and soil-gas monitoring well locations on the existing base map. All surveying will be performed under the supervision of a New York State licensed land surveyor, following the requirements of the Scope of Work and HASP.

The horizontal positions will be tied into the North American Datum 1983 (NAD83) East Zone coordinate system. The vertical positions will be tied to the North American Vertical Datum 1988 (NAVD88). The measuring point associated with the existing monitoring wells or other site reference features will be recorded to a vertical accuracy of 0.01 ft. The final survey will be supplied in a digital CAD format (i.e., .dwg or .dxf files in the cited coordinate systems).

2.8 Green and Sustainable Remediation

The work to be completed will comply with NYSDEC guidance documents including DER-31: Green Remediation (2010b). To ensure compliance with DER-31, the work will be completed using the best management practices (BMPs) and techniques described below. In addition to the items discussed in Section 10.0 – Field Records and Documentation, specific reporting methods relative to DER-31 are further described in the following subsection.

2.8.1 Best Management Practices and Techniques

DER-31 provides some examples of BMPs that could be applied during all phases of remediation (see Attachment 1 of the DER-31 policy). Additional resources to identify potential BMPs and techniques applicable to this work include:

- United States Environmental Protection Agency CLU-IN Green Remediation (www.clu-in.org/greenremediation/);
- Interstate Technology & Regulatory Council Green and Sustainable Remediation (www.itrcweb.org/teampublic_GSR.asp);
- NAVFAC Green and Sustainable Remediation (www.ert2.org/t2gsrportal/);
- Air Force Center for Engineering and the Environment Sustainable Remediation (www.afcee.af.mil/resources/technologytransfer/programsandinitiatives/sustainableremediation/index.asp); and
- Sustainable Remediation Forum (www.sustainableremediation.org).

Lastly, NYSDEC expects that the BMPs identified below will be implemented at sites unless a site-specific evaluation demonstrates impracticability or favors an alternative green approach:

- Use renewable energy where possible or purchase Renewable Energy Credits (RECs);
- Use of remediation technologies with an intermittent energy supply (i.e., energy use during peak energy generation only);
- Incorporate green building design;
- Reuse existing buildings and infrastructure to reduce waste;
- Reuse and Recycle construction and demolition (C&D) debris and other materials (i.e., grind waste wood and other organics for on-site use);
- Design cover systems to be usable (i.e., habitat or recreation);
- Reduce vehicle idling;
- Use of Low Sulfur Diesel Fuel (LSDF) or alternate fuels (i.e., biodiesel or E85);
- Sequence work to minimize double-handling of materials; and
- Use energy efficient systems and office equipment in the job trailer.

Prior to initiating any field work, the Project Manager will identify applicable BMPs to be used for each work assignment. At a minimum, each BMP identified above will be included in the site-specific work plan with a discussion of how each practice or technique will be implemented or why a practice or technique is not appropriate to the work anticipated at the site.

2.8.2 Reporting

All Green and Sustainable BMPs employed during field activities will be discussed within the field log books described in Section 9.0 – Field Records and Documentation. Specifically, the field log books

will acknowledge that the practices and techniques identified for the site work were taken each day (if applicable). In addition, the following information will be recorded within the field log books at the close of each day:

- The estimated quantity of fuel consumed by onsite vehicles and equipment;
- The estimated distance traveled by trucks and equipment delivering goods or removing waste; and
- The estimated water use during onsite activities.

The information will be compiled and presented to NYSDEC in a form suitable to the site-specific work completed.

3.0 Drilling Procedures

The most common drilling technologies used are hollow-stem auger (HSA) drilling and Rotosonic drilling. Procedures for these activities are described below.

3.1 Hollow-Stem Auger Drilling Procedures

A standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

1. HSAs, drill rods, and the drill rig will be thoroughly decontaminated prior to initial borehole installation and between each borehole at the centralized decontamination area. All decontamination liquids will be collected and placed in DOT-approved 55-gallon drums.
4. The drill rig will be inspected for oil leaks and any leaks reported prior to starting drilling operations.
5. Advance the boring by rotating and advancing the HSAs to the desired depth. The borings will be advanced incrementally to permit continuous or intermittent subsurface soil sampling, as required.
6. Remove center plug from the HSAs and collect a split spoon sample per the method stipulated by the project geologist or hydrogeologist.

References: American Society for Testing and Materials (ASTM) D1452/D1452M-16.

3.2 Rotosonic Drilling Procedures

Rotosonic Drilling (also known as Sonic Drilling, Rotosonic, Rotary Sonic, Sonicore or Resonant Sonic Drilling) is a subsurface drilling method that employs the use of high frequency mechanical vibrations to take continuous core samples of overburden and most bedrock formations using a dual cased drill string. Rotosonic drilling is also used to advance casing in the ground for the installation of monitoring wells and other purposes.

Procedure:

1. Core barrel and outer casing will be decontaminated prior to advancing boreholes.

The core barrel (core barrels are typically 5, 10 or 20 feet in length) is attached to the drill head. The boring is advanced by rotating the core barrel incrementally to the desired depth. The borings will be advanced incrementally to permit continuous subsurface soil sampling.

2. Once the core barrel is driven to its incremental depth (i.e., 5, 10 or 20 feet), the drill head is disconnected from the core barrel and connected to the outer casing. The outer casing is then

driven down over the core barrel. Note: A small amount of water may be used during the driving of the outer casing to flush materials from the annular space between the core barrel and the outer casing.

3. The drill head is disconnected from the outer casing and reattached to the core barrel. The core barrel is brought to the surface and a clear polyethylene tube is attached to the end of the core barrel. The drive head is vibrated which extrudes the soil sample into the polyethylene tube.
4. The core barrel is reinserted into the outer casing and the boring is advanced to the desired depth by repeating Steps 2 through 4.
5. Split the sample lengthwise and screen the soil with a photoionization detector (PID) for volatile organic vapors
6. Document all properties and sample locations in the field notebook and Boring Log form (Appendix A).

Reference: ASTM D6914/D6914M-16.

4.0 Groundwater Investigation Tasks

Groundwater investigations are typically part of a site investigation. Field activities which may be implemented as part of a groundwater investigation include (but are not limited to) the following:

- Existing Well Condition Survey
- Groundwater Elevation Survey
- Direct Push Groundwater Sampling
- Monitoring Well Installation
- Monitoring Well Development
- Groundwater Sampling from Monitoring Wells
- Aquifer Properties Testing (hydraulic conductivity “slug” testing)
- Aquifer Properties Testing (pumping test)

4.1 Monitoring Well Inspection and Maintenance

An assessment of the condition and subsequent maintenance of existing monitoring wells may be necessary. As monitoring wells may have been installed over an extended period and by different organizations, the available data varies and in some cases is contradictory. It is possible that some of the wells can no longer be found. In addition, the condition of the wells (and suitability for sampling) may not be known. Therefore, prior to initiating any sampling at the site, an initial well condition survey may be conducted if requested by NYSDEC; or if determined to be appropriate by site personnel and with NYSDEC concurrence. The following procedure should be employed whenever the monitoring wells are opened for gauging and sampling:

1. Use the Monitoring Well Inspection Form (Appendix A) to record the conditions of the various components of the monitoring well and protective casing including lock/hasp, hinge/lid, J-plug, gasket seal, and security bolts.
2. Coat security bolts with anti-seizing compound to prevent seizure in the cast iron flush mount curb boxes.
3. In wells, record depth to water, depth to bottom, and depths to the top and bottom of any light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) layers.
4. Record any maintenance performed on the well and stencil as needed.
5. All sections of the inspection form should be completed, and photographs taken before and after inspection and maintenance.

4.1.1 Road Box Replacement Procedures

Often during an inspection, it is determined that a monitoring well's road box is damaged and needs to be replaced. The following procedure should be employed whenever a road box is replaced:

1. Cut the pavement with a jackhammer and hand-excavate the surrounding soil to a depth of approximately 1 ft. below ground surface (bgs). If the surrounding surface is covered with asphalt instead of concrete, then hand cut the asphalt.
2. Any concrete or asphalt cuttings will be placed in a 1A2 open head 55-gallon steel drum.
3. Remove the damaged road box and install the new road box. The damaged road box will be placed in a 1A2 open head 55-gallon steel drum.
4. Backfill around the newly installed road box with the excavated soil, leaving enough room for a concrete pad/asphalt patch.
5. Construct a 2 ft. by 2 ft. square concrete pad/asphalt patch surrounding the new road box.
6. Concrete should not be poured when the temperature is below 40 degrees Fahrenheit. If it must be poured under these conditions, an anti-freeze agent must be added to the cement mixture and the concrete pad will be covered with a sheet of plastic or a concrete blanket to prevent the pad from freezing and cracking.
7. An orange cone will be placed near the monitoring well to prevent vehicles from driving over the newly repaired road box.
8. The drums will be addressed in accordance with the protocols outlined in Section 8.2.

4.2 Groundwater Elevation Survey

In order to better understand the hydrogeologic conditions, synoptic water level readings will be collected during every groundwater monitoring event. A groundwater elevation survey may be taken as an initial task (e.g., concurrent with the existing well condition survey), or it may be performed at the conclusion of a well installation program, or both. Elevation surveys may be taken over several years, over several times of year to assess seasonal factors, or multiple times in a day to assess tidal or diurnal cycles which may influence groundwater elevations and flow directions.

Water levels in monitoring wells scheduled to be sampled during the field work will be measured using an electronic water level indicator. Initially, measurements will be taken following well development until the well has recovered to anticipated static conditions. Water level measurement procedures are presented below.

Procedure:

1. Clean the water level probe and the lower portion of cable following standard decontamination procedures (Section 8.1) and test water level meter to ensure that the batteries are charged.
2. Lower the probe slowly into the monitoring well until the audible alarm indicates water.

3. Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference point.
4. Repeat the measurement for confirmation and record the water level.
5. Remove the probe from the well slowly, drying the cable and probe with a clean "Chem Wipe" or paper towel.
6. Replace the well cap and lock protective cap in place.
7. Decontaminate the water level meter (Section 8.0) if additional measurements are to be taken.

Reference: ASTM D4750-87(2001).

4.3 LNAPL/DNAPL Water Level Survey Procedures

When conducting groundwater measurement from monitoring wells, the presence and thickness of Non-Aqueous Phase Liquids (NAPL) may be monitored. The following procedure will be used to determine the presence and thickness of NAPL. NAPLs are typically measured using an oil/water interface meter.

Procedure:

1. To meet safety requirements and protect electronics from damage, always ground the meter by attaching the ground clamp to the metal well casing.
2. Before beginning any measurement, check the electronics and battery condition by pressing the 'START/OFF' button. A brief tone and red light indicate the meter is functional. A flashing green light indicates the meter is on. NOTE: Meters typically shut off automatically after 10 min to conserve battery life and will have to be turned back on.
3. Lower the probe end into the well and slowly lower until water or NAPL is contacted. A steady tone and light indicate a non-conductive liquid (e.g. product). An intermittent tone and light indicate a conductive liquid (e.g. water).
4. For floating product (LNAPL), take the air/product interface measurement on the way into the liquid and the water/product interface on the way up. When passing through product into water, some product may adhere to the probe sensors due to surface tension. Therefore, when water is detected below the product, the probe should be raised and lowered rapidly in a short vertical motion to remove any product that may have been carried down with the probe.
5. The water/product interface should then be measured as the probe is raised very slowly back up. Once the interface is detected the probe can be raised and lowered in small increments to precisely determine the interface.
6. Repeat measurements to confirm water/product interface.
7. To determine the thickness of product, subtract the water/product interface from the product/air interface.

8. To determine if there is any sinking product (DNAPL) in the well, continue lowering the probe slowly. If steady signals activate, determine the top of the sinking layer by reading directly from the tape. Continue lowering the probe slowly until the tape slackens when the well bottom is reached. Read the level directly from the tape and subtract one from the other to determine thickness.
9. Upon completion of readings clean the tape and the probe.

4.4 Monitoring Well Installation

Monitoring well installation is part of many site investigations. The number and locations of proposed monitoring wells will be shown on a figure in the site-specific Work Plan or site-specific FAP.

The default method for advancing overburden borings for monitoring well installation will be using 4¼-inch hollow stem augers (HSAs) with a center plug. The HSAs will be advanced to the target depth for well installation. If difficulties with running sands are encountered which hinder drilling, potable water may be introduced into the HSAs to maintain a positive hydrostatic head. For very difficult overburden drilling or for wells installed in bedrock, water rotary drilling methods will be employed.

Monitoring well borings will be advanced to the target depths listed in the site-specific Work Plan. Subsurface soil samples will be obtained in accordance with Section 5.2 and logged in accordance with Section 8. **Error! Reference source not found.** Soil cuttings will be screened for organic vapors using a PID.

4.4.1 Overburden Monitoring Well Construction Procedures

This section provides a method for construction of groundwater monitoring wells within unconsolidated material, which enables monitoring of groundwater elevation and acquisition of groundwater samples for laboratory testing. Groundwater monitoring wells and piezometers will be installed using the procedures described below.

Procedure:

1. Advance subsurface boring to the desired depth by means of hollow-stem auger drilling.
2. While boring, collect split spoon samples on a continuous basis to geologically log the boring.
3. Remove center plug from augers and verify borehole depth using weighted measuring tape.
4. Add washed and graded medium sand as needed to base of borehole.
5. Insert the well screen and riser pipe into borehole through the hollow stem augers. Cap the riser to prevent well construction materials from entering the well.

6. Add sand to screen section of well while slowly removing augers. Sand pack should extend at least two feet above the top of the screen section. Measure with a tape.
7. Slowly add bentonite pellet seal to borehole as augers are slowly removed. The bentonite seal should extend at least two feet above the top of the sand pack section. Measure with tape.
8. Note: The rate of removal of the auger from the borehole should closely follow the rate that the sand pack and bentonite pellets fill the borehole.
9. If bentonite seal is placed above the groundwater level within the borehole, add water to the borehole to hydrate the bentonite pellets. Allow pellets to hydrate for at least 30 minutes.
10. Mix cement/bentonite grout per manufacturer's specifications.
11. Add grout to borehole through tremie pipe or hose from the top of the bentonite seal to the ground surface.
12. Remove remaining augers from the borehole.
13. Top off grout in borehole. Grout should extend to approximately two feet below ground surface.
14. Cut well-riser pipe to about three feet above the ground surface for stickup type wells. Flush-mount well risers should be cut off just below surface grade.
15. Backfill the remaining two feet of the borehole with concrete.
16. Install a protective casing over the well riser pipe and set it into the concrete backfill.
17. Lock the protective casing cover.
18. Document well construction in the field notebook and on a Well Construction Detail diagram (Appendix A).

Reference: ASTM D5092/D5092M-16.

4.5 Well Development

Following completion of groundwater monitoring well installation, each monitoring well will be developed by pumping until the discharged water is relatively sediment free and the indicator parameters (pH, temperature, and specific conductivity) have reached steady state. Developing the monitoring well not only removes any sediment but also may improve the hydraulic properties of the formation. The effectiveness of the development measures will be closely monitored in order to keep the volume of discharged water to the minimum necessary to obtain sediment-free samples. A portable turbidimeter will be used to monitor effectiveness of development. A turbidity reading of < 50 Nephelometric Turbidity Units (NTU) and steady-state pH, temperature, and specific conductivity readings will be used as a guide for discontinuing well development.

Procedure:

1. An appropriate monitoring well development method should be selected, depending on water level depth, well productivity, and sediment content of water. Monitoring well development options include: (a) manual pumping; and (b) powered suction-lift or hydrolift pumping.
2. Equipment should be assembled, decontaminated (if necessary), and installed in the well. Care should be taken not to introduce contaminants to the equipment during installation.
3. Monitoring well development should proceed by repeated removal of water from the well until the discharged water is relatively sediment-free. All development waters will be containerized. Effectiveness of development should be monitored at regular intervals using a portable turbidimeter and water quality meter. Volume of water removed, and turbidity, pH, temperature, and conductivity measurements will be recorded on a Well Development/Purging Log form (Appendix A).
4. Monitoring well development will be discontinued when the turbidity of the discharged water is below 50 NTU and the other indicator parameters have stabilized.

Reference: ASTM D5092/D5092M-16.

4.6 Groundwater Sampling from Monitoring Wells

Groundwater sampling will be performed to evaluate the extent of groundwater contamination. The rationale, locations, wells, and analytical parameters will be specified in the site-specific Work Plan or FAP and QAPP addenda.

4.6.1 Monitoring Well Purging Procedure

Unless specified otherwise in the site-specific Work Plan and approved by NYSDEC, groundwater sampling will be done in accordance with *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers* (USEPA OSWER 542-S-02-001). The default groundwater sampling method will be in accordance with EPA's low stress (often referred to as low flow) sampling technique (EPA, 1998).

Monitoring well purging will be completed using the low-flow purging technique as follows:

1. The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using a photoionization detector (PID). If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.
2. Using an electronic water level detector, the water level below top of casing will be measured. Knowing the total depth of the well, it will be possible to determine the volume of water in the well. The end of the probe will be soap-and-water-washed and deionized-water-rinsed between wells. The bottom of the well will also be checked for DNAPL using the interface probe/water level indicator. The end of the probe will be decontaminated between wells.
3. Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).

4. Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity). New dedicated equipment will be used for each well.
5. Purge well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full scale range; pH - 0.10 pH unit; temperature - 0.2°C, and turbidity <50 NTU.
6. Purging of a specific number of well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.
7. Indicator parameters of pH, conductivity, dissolved oxygen, oxygen/reduction potential, turbidity, and temperature must be measured continuously using the flow cell.
8. Well purging data are to be recorded in the field notebook and on the Well Purge Log (Appendix A).
9. Dispose of sampling equipment as per Section 6.2.

4.6.2 Sample Collection Procedures

Procedure:

1. After well purging is completed, a sample will be collected into the appropriate containers.
2. Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.
3. All sample bottles will be labeled in the field using a waterproof permanent marker (Section 10.4).
4. Samples will be collected into sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.
5. Remove pump and disconnect valves and tubing, as necessary. If a submersible pump was used, it must be decontaminated prior to and between each use. Clean pump by flushing 10 gallons of potable water through the pump. Rinse with deionized water after flushing the pump.
6. Well sampling data are to be recorded in the field notebook and on the Well Purging Log (Appendix A).

4.6.3 Sampling Through LNAPL

Procedure:

1. Measure the depth and thickness of the LNAPL layer per Section 4.3.
2. The groundwater sample from below the product will be collected through a 1-inch ID tremie pipe immersed below the LNAPL layer.

3. Insert a slip cap or similar device (i.e., J-plug) to plug the end of the 1" ID PVC pipe and attach a tether to the device so it can be retrieved from the well after sampling is complete. The pipe will be lowered into the well and additional sections of 1" ID PVC pipe will be added, as necessary.
4. Lower the 1" ID PVC pipe into the well with the slip cap/J-plug inserted in the bottom of the pipe. The bottom of the pipe should be lowered through and at least 2' below the bottom of the LNAPL layer.
5. Brace the 1" ID pipe at the surface so it cannot fall further into the 2" well casing.
6. Smaller diameter rods or a weighted section of steel pipe attached to a rope will be used to push the slip cap off the end of the 1" ID PVC pipe. The attached tether will allow retrieval of the J-plug when the 1" tubing is retrieved from the well at the conclusion of sampling.
7. Proceed with sampling the well by inserting purging and sampling tubing through the 1" tubing.
8. When sampling is finished, remove the 1" tubing and slip cap from the well. The 1" ID PVC pipe will be partially coated with LNAPL and should be discarded. The slip cap can be decontaminated or discarded.

4.6.4 Sampling LNAPL or DNAPL

When conducting groundwater sampling from monitoring wells, LNAPL and DNAPL may be collected. The following procedure will be used to collect samples of LNAPL and DNAPL:

1. Measure the depth and thickness of the LNAPL/DNAPL layer per Section 4.3.
2. Using a disposable Teflon or Teflon lined bailer attached to disposable poly twine, lower the bailer so the bottom of the bailer is at the same depth as the bottom of the LNAPL/DNAPL layer.
3. Upon reaching its target depth, raise the bailer with the LNAPL/DNAPL product and place the product in the laboratory supplied containers.
4. Repeat steps 2 and 3 until the laboratory supplied containers are full or there is no more product to remove.
5. Upon completion of the sampling, place the used bailer and twine in a 1A2 open head 55-gallon steel drum.

4.7 Aquifer Property Testing

For some projects, it may be appropriate to conduct aquifer tests to determine various hydrogeologic parameters (aquifer characteristics) such as permeability, transmissivity, and storability. The two primary methods for determining aquifer characteristics are short-term permeability tests (often referred to as "slug" tests) or longer-term aquifer pumping tests.

4.7.1 Aquifer Tests

Available geologic and hydrogeologic data will be evaluated prior to conducting the aquifer test for the purpose of determining a suitable network of wells to complete the aquifer test. An existing well will be used for the aquifer test well, if available. If a suitable well is not available, a new aquifer test well will be installed. The number and location of water level observation wells and the frequency of measurement will be detailed in the site-specific Work Plan.

Pre-test (background), during test, and post-test (recovery) water levels will be collected from a select list of existing or new (as needed) monitoring wells. Water levels will be collected manually using an electronic water level indicator and electronically by transducers with data logging capacity. The wells requiring transducers will be selected after review of the available data from previous groundwater sampling and other appropriate sources.

The aquifer test well will be purged at the maximum practical pumping rate at a constant rate. If the maximum pumping rate is not confirmed, a step test will be performed to determine the maximum pumping capacity of the well. The planned pumping duration may vary as based upon the on-site review of the water level readings collected from the upgradient monitoring wells during the initial phase (first 12 to 24 hours) of the aquifer test. Water level measurements will be collected from select existing and new monitoring wells during the aquifer test at the locations and schedule presented in the site-specific work plan.

Water levels will be measured and recorded during the recovery period. The recovery period will be considered complete when the water level has returned to 90 percent of pre-test levels.

Discharge of large volumes of water generated from the aquifer test can be problematic. Management of this water will be established with NYSDEC and jurisdictional agencies and clearly established in the site-specific Work Plan.

Samples for chemical analysis may be collected from purge water from the test well or from other selected monitoring wells. The samples may be collected at the beginning of the aquifer test and at 12-hour intervals thereafter, including a sample when the test is terminated (or other intervals as specified in the site-specific Work Plan or site-specific FAP). These samples will be analyzed for parameters specified in the Work Plan.

4.8 Slug Tests

Hydraulic conductivity tests (slug tests) may be performed in newly installed wells. During any slug testing, gauging of fluid levels will be performed using a data logger/pressure transducer, and stainless-steel slugs. Since the water table is shallow, only rising head (slug-out) tests will be performed. This test will consist of inserting a 'slug' of known volume into the well/piezometer, allowing the water level in to return to a steady state, removing the slug allowing the water level to return to static conditions. The transducer/data logger will record changes in water level. These data will be analyzed using the methods of Bouwer and Rice (1976) and Bouwer (1989).

Slug testing is a rapid and inexpensive procedure for estimating the horizontal hydraulic conductivity of an aquifer material screened by a monitoring well. Equipment consists of dedicated/disposable nylon rope, decontaminated stainless steel slug and a data logger/pressure transducer, and a water level indicator.

Procedure:

1. Measure dimensions of the slug to be used to displace water in the monitor and predetermine the volume of water, which will be displaced, and corresponding initial water level change, which will occur by adding or removing the slug.
2. Record initial water level in the wells (static water level).
3. Lower the pre-cleaned data logger/pressure transducer into wells to the wells bottom. Pull transducer up one foot.
4. Insert slug into well, below water table, with nylon rope. Allow water level in well to return to static condition.
5. Simultaneously initiate data logger/pressure transducer and rapidly remove the slug from the wells.
6. Monitor water level recovery in well with data logger/pressure transducer until static water level has been regained.
7. Download data logger/pressure transducer and record data in field notebook. Review data to verify slug test was successful.
8. Remove equipment from well and decontaminate.
9. Analyze data in office using computer.

4.9 Monitoring Well Decommissioning

Monitoring well decommissioning will be performed in accordance with NYSDEC Policy CP-43, using the following steps:

1. Each well will be tremie grouted from the bottom of the well to within five feet of the ground surface to ensure a continuous grout column. Grout slurry composition should be the following:
 - a. 1.5 to 3.0 percent by weight - Bentonite (Quick Gel)
 - b. 40 to 60 percent by weight - Cement (Portland Type I)
 - c. 40 to 60 percent by weight - Water
2. The well casing will be removed at a depth of five feet below grade (if possible) and the outer protective casing "stick-up" and/or flush-mount curb box will be removed only after the well has been properly filled with grout.

3. A metal marker (PK Survey Spike) will be embedded in the top of the grout to indicate the location of the former monitoring well.
4. The uppermost five feet of the borehole will be filled with approved/clean backfill or topsoil.
5. The surface of the borehole will be restored to the condition of the area surrounding the borehole (crushed stone, asphalt, etc.). If the surrounding surface is a concrete sidewalk flag, that flag will be replaced in accordance with applicable regulations/standards.
6. The solid waste should be handled in accordance with Section 8.2 of this plan.
7. Document well construction details in the field notebook and transfer the data onto the Well Decommissioning Record form (provided in CP-43).

Reference: ASTM D5299/D5299M-18

Reference: NYSDEC CP-43: *Groundwater Monitoring Well Decommissioning Policy*, November 3, 2009.

4.10 Plugging/Abandoning Borehole and Grout Mixing

Boreholes that are not completed as monitoring wells, will be sealed (plugged) prior to abandonment to prevent downhole contamination. In addition, the annular space in monitoring wells need to be sealed after the installation of the sand pack and bentonite seal to prevent any downward migration of surface water into the well. Sealing can be achieved by backfilling the borehole with bentonite below the water table (hole plug or pellets) and/or with a cement/bentonite grout above the water table. The backfill material will be introduced from bottom to top using either a tremie pipe or the drill rods. Shallow borings will be sealed with bentonite (hole plug or pellets) the entire length of the boring.

Procedure:

1. Determine most suitable seal materials. Grout specifications generally have mixture ratios as follows:

Grout Slurry Composition (Percent Weight)

1.5 to 3.0 percent - Bentonite (Quick Gel)

40 to 60 percent - Cement (Portland Type I)

40 to 60 percent - Water

2. Calculate the volume of the borehole based on the bit or auger head diameter plus 10 percent and determine the volume of grout to be emplaced. Generally, the total mixed volume is the borehole volume plus 20 percent.
3. Identify the equipment to be used for preparing and mixing of the grout. Ensure the volume of the tanks to be used for mixing has been measured adequately. Document these volumes.

4. Identify the source of the water to be used for the grout and determine its suitability for use. In particular, water with high sulfate or chloride levels, or heated water, should not be used. These types of waters can cause operational difficulties or modify the set-up for the grout.
5. Identify the equipment to be used for emplacing the grout. Ensure that the pump to be used has adequate pressure to enable complete return to surface.
6. Identify the volumes to be pumped at each stage or in total if only one stage is to be used.
7. Prepare the borehole plugging plan and discuss the plan and activities with the drilling contractor prior to beginning any mixing activities.
8. Begin mixing the grout to be emplaced.
9. Record the type and amount of materials used during the mixing operation. Ensure that the ratios are within specification tolerance.
10. Begin pumping the grout through the return line bypass system to confirm that all pump and surface fittings are secure.
11. Initiate downhole pumping. Record the times and volumes emplaced on the form.
12. Document the borehole is completely filled with grout.
13. Clear and clean the surface near the borehole. Level the ground to about the pre-existing grade. Add grout or cement as necessary to the area near the borehole.

Note: On occasion, there may be some settling of the grout, which takes place over several days. If this settling occurs, the natural soil from the immediate vicinity is used to put the level at grade. A follow-up check at each site should be made within one week to 10 days of completion. Document the visit and describe any action taken.

5.0 Soil Sampling Activities

Soil sampling activities which may be typically conducted include surface soil sampling, subsurface soil sampling, and test pit excavation. Procedures for these activities are described below.

5.1 Surface Soil Sampling

Surface soil samples (defined as soil samples from the first six inches or fewer of native soil) will be taken at locations identified in the site-specific Work Plan or site-specific FAP. Near-surface soil sampling by hand implements is also discussed in this section.

5.1.1 Surface Soil Sample Collection Procedure

1. Using a decontaminated stainless-steel trowel or by hand (protected by a chemically resistant glove), remove rocks, stone, grass, and debris to gain access to the surface soils.
2. Using a decontaminated stainless device (teaspoon, trowel, "scoopula," or similar), transfer the exposed soils directly into the laboratory-provided sample containers. Sampling depth typically should not exceed six inches.
3. Complete the label on the sample container and transfer the sample container(s) to an iced cooler.
4. After collection of the sample, screen the hole with a photoionization detector for volatile organic vapors. Record the readings and any significant observations such as staining, oily sheen, or odors.
5. If the location is to be surveyed, place a stake in the center of the hole after backfilling the hole with the excavated material. Otherwise, measure the location from fixed (permanent) objects using a tape measure.

5.1.2 Near-Surface Soil Sampling (by Hand Auger)

1. Remove stones, vegetation, debris etc. from the ground surface in the sampling area.
2. Lay a section of plastic sheet adjacent to the soil sampling location.
3. Use a clean (decontaminated) bucket auger, required extension rods and "T" handle to collect a soil sample from the desired depth.
4. Monitor volatile organic compounds (VOCs) in the ambient air during soil collection.
5. Turn the auger in a clockwise direction with the "T" handle to remove soil until the desired soil sampling depth is reached. Place the excavated soil on the adjacent plastic. If possible, lay out the cuttings in stratigraphic order.
6. During auger advancement record observations made of the geologic features of the soil.

7. Stop advancing the auger when the top of the specified sampling depth has been reached. Decontaminate the auger.
8. Insert the auger into the borehole to the sample depth and collect the sample. Place sample on ice and ship overnight to the lab under COC custody.
9. Decontaminate the auger bucket and complete the preceding steps for sample collection from deeper depths.
10. When sampling is complete, place cuttings back in the borehole in the order in which they were removed if possible. Top off with hydrated bentonite pellets.

Reference: ASTM D6907-05(2016).

5.2 Subsurface Soil Sampling

Borings will be advanced at the locations as specified in the site-specific Work Plan or site-specific FAP. Borings are typically advanced either by direct push (geoprobe) methods or by HSA drilling. Soils will normally be logged during subsurface sampling, regardless of the method selected. Typical procedures for direct push sampling, sampling from HSA borings, and soil logging are presented below.

5.2.1 Subsurface Soil Sampling from Direct Push Borings

Soil samples will be collected at specific locations identified in the site-specific Work Plan, or based on field observations (e.g., if contamination is observed or if elevated PID readings are recorded). The soil samples will be analyzed for parameters as indicated in the site-specific Work Plan.

A standard method of subsurface boring using hydraulically powered (static force plus percussion) soil-probing equipment that enables the recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

1. Inspect the sampling equipment to ensure proper working condition.
2. Insert dedicated disposable acetate liner into the sampler and select additional components for the sampler as required (i.e., leaf spring core retainer for clays, or a sand trap for non-cohesive sands).
3. Lower the sampler to the ground surface, or bottom of the hole previously made by the sampler and check the depth against length of the rods and the sampler.
4. Attach the drive head assembly to the sample rods.
5. Push the sampler in increments up to 5 feet into the subsurface up to the desired depth with a hydraulic press.

6. Rotate the sampling rods clockwise and remove the sampler.
7. Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.
8. Document all properties and sample locations in the field notebook, and on the Direct-Push Log form (Appendix A).
9. Abandon the direct-push boring by backfilling with bentonite pellets and hydrate with potable water or use concrete patch in impervious areas.

Reference: ASTM D6282/D6282M-14.

5.2.1.1 Remote Direct-Push Soil Sampling

Standard equipment used for remote direct push sampling is the 420M Geoprobe® (or similar unit). This is a light weight and durable limited access machine designed to be deployed to hard-to-reach or limited access sampling locations. The machine is powered by a remote hydraulic source which is connected through auxiliary hydraulics.

Procedure:

1. Read and understand all safety, maintenance and operations instructions regarding this machine before beginning operations.
2. Maneuver the probe unit to place the probe foot near the desired probing location.
3. Position the power source near the unit leaving sufficient distance so as not to be in the way of probing activities.
4. The probe unit is intended for operations on level surfaces. Do not use on slopes greater than 2 degrees due to decreased stability.
5. Connect hydraulic hoses to probe unit and power source.
6. Start the engine of the hydraulic power source to allow engine and hydraulics to warm sufficiently and ensure there is adequate ventilation for exhaust fumes.
7. Make sure everyone is clear of any moving parts before engaging the hydraulics of the probe unit. Check the emergency stop button for proper operation. If the emergency stop button doesn't work, cease operations.
8. Anchor the probe derrick to floor or ground surface as needed based on conditions.
9. Insert dedicated disposable acetate liner into the sampler and select additional components for the sampler as required (i.e., leaf spring core retainer for clays, or a sand trap for non-cohesive sands).
10. Lower the sampler to the ground surface, or bottom of the hole previously made by the sampler and check the depth against length of the rods and the sampler.

11. Attach the drive head assembly to the sample rods.
12. Push the sampler in increments up to 5 feet into the subsurface up to the desired depth with a hydraulic press.
13. Rotate the sampling rods clockwise and remove the sampler. Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.
14. Document all properties and sample locations in the field notebook, and on the Direct-Push Log form (Appendix A).
15. Abandon the direct-push boring by backfilling with bentonite pellets and hydrate with potable water or use concrete patch in impervious areas.

Reference: ASTM D6282/D6282M-14.

5.2.2 Split Spoon Sampling Procedures

Split-spoon sampling is a standard method of soil sampling to obtain representative samples for identification and laboratory testing as well as to serve as a measure of resistance of soil to sampler penetration. Split-spoon samples will be collected during boring advancement at continuous 2-foot intervals.

Procedure:

1. Measure the sampling equipment lengths to ensure that they conform to specifications. Confirm the weight of the hammer (140 pounds.).
2. Clean out the HSAs to the bottom depth prior to sampling. Select additional components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands).
3. Lower the decontaminated 2-inch outside diameter (O.D.) split-spoon to the bottom of the HSAs and check the depth against length of the rods and the split-spoon.
4. Attach the drive head and hammer to the drill rods without the weight of the hammer resting on the rods.
5. Lower the weight and allow the split-spoon to settle up to 6 inches below the bottom of the HSAs. If it settles more, consider use of another type of sampler.
6. Mark four 6-inch intervals on the drill rods relative to a drive reference point on the rig. With the split-spoon resting on the bottom of the hole, drive the split-spoon with the 140-pound hammer falling freely over its 30-inch fall until 24 inches have been penetrated or 50 blows have been applied in any 6-inch interval.
7. Record the number of blows required to drive the split-spoon 6 inches into the overburden. Determine the "N" value by adding the blows for the 6-to 12-inch and 12-to 18-inch interval of each sample attempt.

8. After penetration is complete, remove the split-spoon sampler.
9. Open the split-spoon to determine the percent recovery and describe the soil.
10. Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.
11. Document all properties and sample locations in the field notebook, and on the Boring Log form (Appendix A).

Reference: ASTM D1586/ D1586M-18.

5.2.2.1 Unified Soil Classification System

Soils are classified for engineering purposes according to the Unified Soil Classification System (USCS) adopted by the U.S. Army Corps of Engineers and U.S. Department of the Interior Bureau of Reclamation. Soil properties that form the basis for the USCS are:

- Percentage of gravel, sand, and fines;
- Shape of the grain-size distribution curve; and
- Plasticity and compressibility characteristics.

According to this system, all soils are divided into three major groups: coarse-grained, fine-grained, and highly-organic (peaty). The boundary between coarse-grained and fine-grained soils is taken to be the 200-mesh sieve (0.074 mm). In the field the distinction is based on whether the individual particles can be seen with the unaided eye. If more than 50% of the soil by weight is judged to consist of grains that can be distinguished separately, the soil is considered to be coarse-grained.

The coarse-grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50% of the visible grains are larger than the No. 4 sieve (3/16 inch). They are each divided further into four groups:

W: Well graded; fairly clean (<5% finer than 0.074 mm)

P: Poorly graded (gap-graded); fairly clean (<5% finer than 0.074mm)

C: Clayey (>12% finer than 0.074mm); plastic (clayey) fines. Fine fraction above the A- line with plasticity index above 7.

M: Silty (>12% finer than 0.074 mm); non-plastic or silty fines. Fine fraction below the A- line and plasticity index below 4.

The soils are represented by symbols such as GW or SP. Borderline materials are represented by a double symbol, as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower than 50% (L), or higher than 50% (H).

The distinction between the inorganic clays (C), the inorganic silts (M), and organic soils (O) is made on the basis of a modified plasticity chart. Soils CH and CL are represented by points above the A-line, whereas soils OH, OL, and MH correspond to positions below the A-line. Soils ML, except for a few clayey fine sands, are also represented by points below the A-line. The organic soils O are distinguished from the inorganic soils M and C by their characteristic odor and dark color.

Reference: ASTM D2487-17.

5.2.2.2 Visual Identification

Soil samples collected during boring advancement will be visually identified. Soil properties required to define the USCS classification of a soil and other observed characteristics normally identified in describing a soil are defined below:

- a. Color
- b. Moisture conditions
- c. Grain size
 - i. Estimated maximum grain size
 - ii. Estimated percent by weight of fines
(material passing No. 200 sieve)
- d. Gradation
- e. Grain shape
- f. Plasticity
- g. Predominant soil type
- h. Secondary components of soil
- i. Classification symbol
- j. Other features such as:
 - organic, chemical, or metallic content;
 - compactness;
 - consistency;
 - cohesiveness near plastic limit;
 - dry strength; and
 - source - residual, or transported (aeolian, water borne, glacial deposit, etc.)

Reference: ASTM D2488-17.

5.2.3 Shelby Tube Sampling Procedures

Shelby (thin-wall) tube sampling is commonly used in cohesive soils (where split-spoon sampling results in an "N" value less than 15) to obtain relatively undisturbed samples. The thin-walled tube

accepts the least frictional resistance as the soil moves up into the sampler. The sampler is advanced in a continuous and rapid motion without twisting on impact.

Procedure:

1. Clean borehole to the required sampling depth, using care not to disturb the material to be sampled during the cleaning process.
2. Prepare the sampler for use, verifying that the tube is round, smooth, not dented or scratched, rust-free, and that the cutting edge has been honed to proper dimensions.
3. Record dimensions of the sampler. Note that the length and diameter of the sampler can be varied depending on soil conditions.
4. Lower the sampler on the drill rods to the bottom of the hole.
5. Make a reference point on the drilling rig and measure a length on the rods equivalent to the sample tube length, minus 10% (this allows for slough in the hole).
6. Raise the water level in the hole to ground surface or above, if practical (this step likely may be omitted).
7. Push the sampler the required distance into the soil with continuous motion of consistent weight.
8. If the sampler cannot be advanced by pushing, note the length advanced and stop sampling.
9. Rotate the rods three revolutions, using a wrench to shear the sample. Allow the sampler to sit undisturbed for five minutes.
10. Withdraw the sampler slowly and pull rods evenly to retrieve the sample. Measure sample length and calculate recovery.
11. Clean out the rod end of the tube and discard disturbed slough. Trim cutting edge of the sampler. Use the cuttings for onsite description and, if required, a moisture content sample.
12. If sample length is recessed from either end, insert plug and seal with wax. If the tube is full, seal ends with caps and/or wax the ends, including the caps if possible.
13. Label the sample container and prepare sample for shipping and/or storage.
14. Store and transport sample(s) in an upright position.

Reference: ASTM D1587/D1587M-15.

5.3 Test Pit Excavation

Test pits (test trenches) may be excavated for observational purposes (e.g., to determine the subsurface features causing anomalies detected in geophysical investigations) or to collect subsurface soil samples, or both. General guidelines for test pit excavation are presented below;

however, a site-specific test pit excavation plan must be developed and documented in the site-specific Work Plan or site-specific FAP. In addition, test pit excavation must be addressed in the site-specific HASP.

Procedure:

1. Decontaminate backhoe bucket prior to excavation.
2. Maneuver backhoe into position.
3. Remove subsurface materials in 1-foot lifts. Conduct continuous air monitoring with appropriate air monitoring equipment as indicated in the HASP. Screen soil with photoionization detector (PID) and place excavated soil on plastic sheeting adjacent to test pit.
4. Upon completion of test pit, visually inspect the soil horizons for discoloration, perched water zones or staining and photo document the test pit.
5. Record the following information in the field book for each test pit:
 - The total length and width of the excavation
 - The depth and thickness of distinct soil or lithologic units
 - A lithologic description of each unit
 - A description of any man-made materials or apparent impacted soil encountered.
 - A Test Pit Log sheet will be completed for each test pit (Appendix A).
6. Collect necessary soil samples. The excavator will collect a sample from a specific horizon and bring the sample to the ground surface. No personnel will enter the excavation to collect samples. The sampler will remove approximately 2 inches of soil from the outside of the soil sample prior to collecting the sample to prevent cross contamination of the sample.
7. Soil samples will be placed on ice and shipped overnight to the laboratory under COC control.
8. The test pit will be backfilled with excavated material immediately after the required information has been recorded and the samples collected. The first soils out should be the last soils in when filling the test pit. Soils will be compacted in 1-foot lifts using the excavator bucket. No test pits will be left open overnight.
9. Decontaminate sampling equipment and excavator bucket.

6.0 Decontamination and Management of Investigation Derived Waste

6.1 Equipment Decontamination

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the following procedures specified in the site-specific Work Plan or FAP; the procedures discussed here are general and may be superseded by project-specific requirements (as documented in the site-specific Work Plan or site-specific FAP). Field equipment rinsate blanks are generated and analyzed to monitor the effective of field decontamination procedures.

Cross contamination is minimized by the use of vendor-decontaminated, dedicated, disposable equipment to the extent practical.

6.1.1 Decontamination Procedures

For larger projects, and as indicated in the site-specific Work Plan or site-specific FAP, a decontamination pad may be constructed on the site. The pad will be sized to be large enough to handle the equipment used on site (e.g., drill rig). Additionally, the pad will be used for small equipment decontamination as well as personnel decontamination.

6.1.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as Geoprobe® HydroPunch® samplers, transducer probes and cables, will be accomplished using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g. Alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute.

Equipment should be allowed to dry prior to use. Steam cleaning or high-pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

Electric submersible pumps (such as a Grundfos Redi-Flow II) will be decontaminated using the above steps followed by running a large volume (several gallons) of potable water through the pump,

followed by an analyte-free water rinse. Tubing will not be re-used (new tubing will be used for each well). Submersible pumps and supporting lines and cables will be placed in a plastic bucket filled with Liquinox and potable water and then run for several minutes (to decontaminate both exterior and interior parts). The process will be repeated with potable water. Submersible pumps will also be given a final analyte-free water rinse of both interior and exterior parts.

If bladder pumps are used, the pump will be disassembled and cleaned after each use. A new bladder will be used for each sample. Small parts, such as screens and gaskets will be replaced after each use. Dedicated airline tubing and Teflon sample tubing will be used at each monitoring well. The pump will be cleaned using the following steps:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;
- Solvent (reagent or pesticide grade) rinse if samples are collected for organic analysis;
- Dilute (10%) nitric acid rinse if samples are collected for metals analysis; and
- Distilled/deionized rinse, air dry.

6.1.3 Heavy Equipment Decontamination

Drilling equipment will be decontaminated before the first use, between boreholes and prior to demobilization using high-pressure steam. Decontamination will be conducted at a dedicated decontamination pad constructed for the project or at an alternate location as indicated in the site-specific Work Plan or site-specific FAP. Decontamination fluids will be containerized (drummed) for subsequent characterization or disposal, unless other arrangements are made on a project-specific basis and as indicated in the site-specific Work Plan.

6.1.4 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the site-specific Work Plan, site-specific FAP, or HASP. This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

6.2 Management of Investigation Derived Waste

Investigation-derived waste (IDW) management will be in accordance with section 3.3(3e) of DER-10 (NYSDEC, 2010). The sampling methods and equipment will be selected to limit both the need for decontamination and the volume of IDW.

IDW generated during field activities include, but is not limited to, the following:

- Purge water;

- Absorbent socks;
- Poly sheeting;
- Spent macrocore liners;
- PPE; and
- Drill cutting and soil boring spoils.

This IDW must be placed in 1A2 open head 55-gallon steel drums pending shipment off site for disposal.

Procedure:

Segregation

Drummed IDW is to be divided into the following categories:

- Drill cuttings and soil boring spoils (see Section 3.0);
- Purgewater from monitoring well development/sampling and DNAPL/LNAPL product; and,
- Solid waste other than drill cuttings and boring spoils (i.e., spent poly tubing, absorbent socks, PPE, etc.).

Generator ID

Any IDW generated is assigned USEPA Generator ID Number NYR000144212.

Hazardous/Non-Hazardous Classification

If necessary, characterization samples will be collected to classify the IDW as either hazardous or non-hazardous. The LNAPL recovery waste is assumed to contain greater than 50 parts per million (ppm) of total polychlorinated biphenyls (PCBs) and therefore is considered a Toxic Substances Control Act (TSCA) waste.

Shipment/Disposal

Drummed IDW must be staged at its point of origin until it is shipped off site on the same day it's generated or staged in a designated and secured area until it can be shipped off site at a later date.

All waste stored in the waste storage enclosure (e.g., LNAPL, oil stained absorbent socks, personal protective equipment) will be drummed into a 55-gallon open top steel drum. Each steel drum will be placed inside an 85 or 95-gallon poly overpack for secondary containment.

All IDW must be shipped off site by a permitted contractor to a permitted facility and may be disposed of at a facility licensed to accept hazardous waste, if necessary.

Manifests

Waste manifests must accompany the IDW during shipment off site for disposal. For non-hazardous waste, a non-hazardous waste manifest must be completed. For hazardous waste, a Uniform Hazardous Waste Manifest (USEPA Form 8700-22) must be completed, along with a Land Disposal Restriction Notification Form 1. IDW manifests can be signed by personnel as agents for the generator (NYSDEC).

7.0 Community Air Monitoring Program

A Community Air Monitoring Plan (CAMP) is used 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 protocols cited below are based on the NYSDOH Generic CAMP (May, 2010; Appendix 1A to DER-10 [NYSDEC, 2010]) which is typically utilized by NYSDEC as guidance for work conducted under these contracts.

7.1 Monitoring

Real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter and surrounding community of the work area may be necessary. Monitoring activities will consist of a combination of continuous and periodic monitoring, which will be performed dependent upon the type of activity being conducted at the site, as discussed below.

The specific types of monitoring necessary and appropriate for any particular project will be determined by NYSDEC and the monitoring contractor and specified in the site-specific Work Plan and site-specific FAP.

7.1.1 Continuous Air Monitoring

Continuous monitoring for VOCs and particulates may be required for ground intrusive activities associated with the site, including, but not limited to, the installation of soil borings and groundwater monitoring wells and test pit excavation.

VOC monitoring will be conducted at the downwind perimeter of the immediate work area on a continuous basis. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. VOC monitoring will be performed using a MiniRAE 2000 or equivalent, which is appropriate to detect a wide range of contaminants typically encountered. The MiniRAE 2000 will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The MiniRAE 2000 is capable of calculating 15-minute running average concentrations, which will be compared to the action levels specified below.

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) such as a Thermo MIE pDR-4000 DataRam or equivalent. The Thermo MIE pDR-4000 DataRam is a real-time monitoring equipment capable of measuring

particulate matter less than 10 microns (μm) in size [PM-10] and capable of integrating over a period of 15 minutes for comparison to the airborne particulate action level. The Thermo MIE pDR is equipped with an audible alarm to indicate exceedance of the action level. In addition to using the Thermo MIE pDR-4000 DataRam, fugitive dust migration will be visually assessed during work activities. If particulate concentrations at the upwind station are higher or equivalent to concentrations at or downwind of work areas, then continuous air monitoring may be discontinued, as approved by NYSDEC.

7.1.2 Periodic (As-Needed) Air Monitoring

Periodic or as-needed air monitoring for VOCs may be required during non-intrusive activities associated with the site-specific Work Plan. Non-intrusive activities may include the collection of soil and sediment samples, the collection of groundwater samples from existing monitoring wells, and the collection of indoor air and soil vapor samples. Periodic air monitoring during sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

7.2 Action Levels and Response

This subsection identifies the action levels and corresponding responses for concentrations of VOCs and particulates detected during the field activities associated with a site.

7.2.1 Volatile Organic Compounds

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

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

If the organic vapor level is above 25 ppm at the perimeter of the work area, field activities will be shut down.

All 15-minute readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings (if any) used for decision purposes will also be recorded.

7.2.2 Particulates

If the downwind PM-10 particulate level is $100 \mu\text{g}/\text{m}^3$ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \mu\text{g}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.

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

Similar to the VOC readings, particulate readings will be recorded and be available for state (NYSDEC and NYSDOH) and county health personnel to review.

8.0 Field Records and Documentation

The objective of this subsection is to provide consistent procedures and formats by which field records will be kept and activities documented, and a methodology by which field records will be managed. Field records and documentation to be used during field activities include Field Log Books and Standard Forms. Standard Forms are provided in Appendix A.

8.1 Field Log Books

Field log books will be prepared and maintained throughout the course of the investigation. **With the exception of PFAS sampling events**, only bound, weatherproof field log books will be used by personnel working on NYSDEC projects. The log books will be turned in for copying/filing/tracking when complete. **If performing PFAS sampling, then loose leaf notebook paper shall be used in lieu of a field log book.**

Each log book will be labeled on the front cover in indelible ink with the following designation: "Site Name/Project Type, NYSDEC Work Assignment Number, Project Number #####."

Log book entries will be recorded in indelible, waterproof ink. If errors are made in any field log book, field record (form), Chain-of-Custody Record, or any other field record document, corrections will be made by crossing a single line through the error, entering the correct information, and initialing and dating the correction.

Standard Forms have been adopted in this FAP to facilitate the collection of consistent data (see Appendix A). This will preclude detailed documentation of, for example, lithologic descriptions in the field log book. A reference, however, to use of each specific form must be made in the log book.

The date will be placed at the top of every page in the left-hand corner of the right page. The time of entry recordings will be in columnar form down the left-hand side of the right page. If an entry is made in a non-dedicated log book, then the date, project name, and project number will be entered left to right, respectively, along the top of the right page. Entries should be dated, and time of entry recorded. At the beginning of each day, the first two entries will be "Personnel/Contractors On Site" and "Weather." At the end of each day's entry or particular event, if appropriate, the person entering the field notes should draw a diagonal line originating from the bottom left corner of the page to the conclusion of the entry and sign along the line indicating the conclusion of the entry or the day's activity.

Entries in field log books will be legible (printing is preferable) and will contain accurate and inclusive documentation of project activities (investigation, monitoring remediation, closure, maintenance, etc.). Information pertaining to health and safety aspects, personnel on site,

visitor's names, association, and time of arrival/departure, etc., should also be recorded. Language should be objective, factual, and free of personal feelings or other terminology that might prove inappropriate, since field records are the basis for later written reports. Once completed, these field log books become accountable documents and must be maintained as part of the project files.

Sample collection and handling activities, as well as visual observations, will be documented in the field log books. The sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements will be identified in the field log books. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment will also be recorded in the field log books, except where these are referenced as being recorded on approved field forms. Field analyses and measurements must be traceable to the specific piece of field equipment utilized and to the field investigator collecting the sample, making the measurement, or conducting analyses. Log books will be updated as field work progresses.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the pages of the field log book that were filled out during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

When an individual log book is full, the log book will be submitted to the project manager for final cataloging and filing. The log books will be stored in the Project File. Copies of specific sections will be made available to personnel upon request.

8.2 Standard Forms

All non-bound field records (e.g., drilling logs, well construction forms, sampling logs, etc.) will be completed the day the associated activity occurs. Field data collected using electronic data loggers or computer entry forms, will be downloaded as soon as practical onto CDs and/or uploaded to office servers. If possible, the person collecting the data will download electronic data on a daily basis. This person will be responsible for verifying that the data collected are adequately represented in electronic media and in the file. Examples of forms typically used are provided in Appendix A of this FAP.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the field forms that were completed during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

8.3 Sample Identification

During this project, a unique sample identifier will designate each sample collected. The following system may be used to assign unique sample identification numbers; however, modifications should be made as needed to clearly and appropriately identify samples for each site or project. Each sample will be identified by an alphanumeric character identifier, as described below.

The following codes will be used for identifying other sample types:

<u>CODE</u>	<u>Sample Type</u>
MW	Monitoring well
SB	Soil boring
SW	Surface water
SD	Sediment
IA	Indoor air
OA (or AA)	Outdoor (or ambient) air
SV	Soil vapor
FB	Field (Rinsate) Blank
N + 50	Field Duplicate (e.g., field duplicate of MW-3S will be MW-53S)
TB	Trip Blank
MS/MSD	Matrix Spike/ Matrix Spike Duplicate

Field blanks and trip blanks will be labeled for the day of collection. For MS/MSD samples, the MS/MSD will be added to the sample ID and included on the COC as a note.

An example of the sample numbering system is provided below.

<u>Sample Identifier</u>	<u>Description</u>
MW-1S	Shallow well MW-1S
MW-101D	Deep monitoring well MW-101D
SB-02-0406	Soil sample from 4 to 6 ft interval from boring SB-02.
SS-01	Surface soil sample from location SS-01.
FBW110502	Field blank associated with water samples collected on 5/2/11
TB110503	Trip blank associated with samples shipped 5/3/11.

8.4 Sample Labeling

A non-removable label will be affixed to each sample container. Labels will be marked with permanent marker pens. The following information will be contained on each label:

Project name;
Sample identifier;
Company ;
Sample date and time;
Sampler's initials;
Sample preservation; and
Analysis required.

8.5 Sample Shipping

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures should follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1. The chain-of-custody (COC) record (Appendix A) should be completely filled out, with all relevant information.
2. The original COC goes with the samples. It should be placed in a Ziploc bag and taped inside the sample cooler. The sampler should retain a copy of the COC.
3. Place inert cushioning material such as bubble-wrap in the bottom of the cooler.
4. Place the bottles in the cooler in such a way that they do not touch (use cardboard dividers or bubble-wrap).
5. Wrap VOA vials securely in bubble-wrap and tape. Place them in the center of the cooler.
6. Pack the cooler with ice in doubled Ziploc plastic bags.
7. Pack the cooler with cushioning material.
8. Tape the drain shut.
9. Wrap the cooler completely with strapping tape at two locations securing the lid. Do not cover any labels.

10. Place the lab address on top of cooler. For out-of-town laboratory, add the following: Put "This side up" labels on all four sides and "Fragile" labels on at least two sides. Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.
11. Ship samples via overnight carrier the same day that they are collected. Samples must be maintained at 4 degrees Celsius (C) $\pm$ 2°C throughout the shipping duration.

9.0 References

American Society for Testing and Materials (ASTM) D1452/D1452M-16, *Standard Practice for Soil Exploration and Sampling by Auger Borings*

ASTM D1586/ D1586M-18. *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.*

ASTM D1587/D1587M-15. *Standard Practice for Thin-Walled Tube Sampling of Fine-Grained Soils for Geotechnical Purposes.*

ASTM D2487-17. *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).*

ASTM D2488-17. *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).*

ASTM D4750-87(2001). *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well).*

ASTM D5092/D5092M-16. *Standard Practice for Design and Installation of Groundwater Monitoring Wells.*

ASTM D5299/D5299M-18. *Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities.*

ASTM D5783-18. *Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices.*

ASTM D6282/D6282M-14. *Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations.*

ASTM D6907-05(2016). *Standard Practice for Sampling Soils and Contaminated Media with Hand-Operated Bucket Augers.*

ASTM D6914/D6914M-16. *Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices.*

New York State Department of Environmental Conservation (NYSDEC), 2008. *NYSDEC Modifications to EPA Region 9 TO-15 QA/QC Criteria.* February 2008.

NYSDEC, 2009. *CP-43 Groundwater Monitoring Well Decommissioning Policy.* November 3, 2009.

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

United States Environmental Protection Agency (USEPA), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. USEPA Office of Emergency and Remedial Response. EPA/540/G-89/004. October.

USEPA, 1998. Region II Sampling SOP - Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling. March 16, 1998.

USEPA, 2002. Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. OSWER. Douglas Yeskis and Bernard Zavala. EPA 542-S-02-001. May 2002.

Tables

Table 1
Field Activities Plan
Kerry Chemical NYSDEC Site 413001
Sample Bottle, Volume, Preservation, and Holding Time Summary

MATRIX/ANALYSIS	Sample Prep Method ⁽¹⁾	Analytical Method ⁽²⁾	Sample Bottles				Minimum Vol Rqd	Preservation ⁽³⁾	Holding Time ⁽⁴⁾		Comment
			Mat'l	Size	Qty	Source			Extraction	Analysis	
Aqueous Samples											
TCL Volatile Organics	SW846 5030B	SW846 8260C	G	40 mL	2 or 3	Lab	40 mL	HCl to pH ≤ 2	NA	14 days	7 days if not preserved to pH <2.
TCL Semi-Volatile Organics	SW846 3510C	SW84270D	G	1L	2	Lab	1L	Cool 4C	7 days	40 days	
TAL Metals	SW846 3005	SW846 6010B/7470A	P	500 mL	1	Lab	500 mL	HNO3 to pH ≤ 2	NA	6 months/28 days	
PFAS	EPA 537 Modified	EPA 537 Modified	P	250 mL	2	Lab	250 mL	Cool 4C	14 days	28 days	
1,4-Dioxane	SW846 3510C	SW846 8270D SIM	G	1L	2	Lab	1L	Cool 4C	7 days	14 days	

(1) Laboratory may propose alternate extraction/preparation methods, subject to NYSDOH ELAP certification and AECOM approval.

(2) More recent versions of analytical methods may be used subject to NYSDEC ELAP certification and approval.

(3) All samples for chemical analysis should be held at 4 degrees C in addition to any chemical preservation required.

(4) Holding time calculated from day of collection, unless noted as being from time of extraction. Laboratory holding times (ASP 2005, Exhibit I) are two days shorter to allow for field handling and shipping.

G = Glass

SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.

Table 2
Field Activities Plan
Kerry Chemical NYSDEC Site 413001
Reporting Limits and QA/QC Sample Quantity Summary

MATRIX/ANALYSIS	Analytical Method	Laboratory	Reporting Limit -Typical (units as specified)	Field Sample Quantity	Matrix Spike (MS)	MS Duplicate	Field Duplicate	Equipment Blank ⁽¹⁾	Trip Blank ⁽²⁾	Total Analyses
Aqueous Samples										
TCL Volatile Organics	SW846 8260C	TBD	0.5 - 1.0 µg/L (typical)	15	1	1	1	0	2	20
TCL Semi-Volatile Organics	SW84270D	TBD	Varies	15	1	1	1	0	0	18
TAL Metals	SW846 6010B/7470A	TBD	Varies	15	1	1	1	0	0	18
PFAS	EPA 537 Modified	TBD	Varies	15	1	1	1	0	0	18
1,4-Dioxane	SW846 8270D SIM	TBD	Varies	15	1	1	1	1	0	19

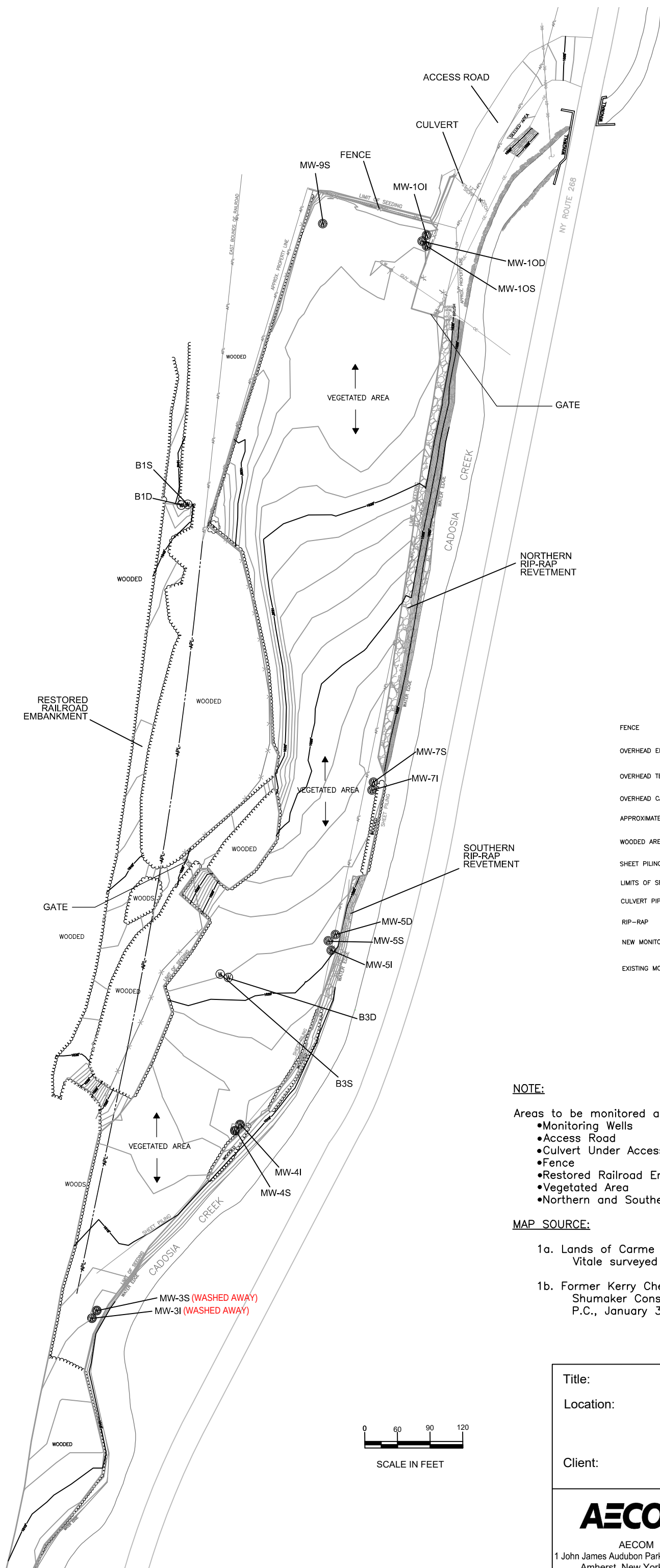
TCL - Targrt Compound List as per USEPA Contract Laboratory Program Statement Of Work For Organic Superfund Methods, Multi-Media, Multi-Concentration SOM02.4, October 2016.

TBD = To be determined. Laboratory services to be provided by NYSDEC call-out contractor

Notes

- 1 Field or equipment rinsate blank quantity will vary depending on sample collection rate and types of sampling equipment used; quantity may be greater or less than that shown. Equipment blanks are not necessary when dedicated disposable equipment is used.

Figures



FENCE	
OVERHEAD ELECTRIC LINE	
OVERHEAD TELEPHONE LINE	
OVERHEAD CABLE T.V. LINE	
APPROXIMATE PROPERTY LINE	
WOODED AREA	
SHEET PILING	
LIMITS OF SEEDING/TOPSOIL	
CULVERT PIPE	
RIP-RAP	
NEW MONITORING WELL	MW-101
EXISTING MONITORING WELL	B3D

Areas to be monitored and maintained include:

- Monitoring Wells
- Access Road
- Culvert Under Access Road
- Fence
- Restored Railroad Embankment
- Vegetated Area
- Northern and Southern Revetments

- 1a. Lands of Carme S. Vitale, Jr. and James F. Vitale surveyed by David J. Beers August 1, 1991.
- 1b. Former Kerry Chemical Site, As-Built Survey, Shumaker Consulting Engineering & Land Surveying, P.C., January 3, 2008.

Title: SITE PLAN

Location: KERRY CHEMICAL COMPANY
APEX CADOSIA ROAD
HANCOCK, NEW YORK

Client: NYSDEC

AECOM
1 John James Audubon Parkway, Suite 210
Amherst, New York 14228

Drafter: DAD	Date: January 2008
Drg. Size: 11x17	Job No.: 11174594.00002

FIGURE 1

Appendix A

Field Activity Forms

CHAIN OF CUSTODY RECORD

TESTS



PROJECT NO.

SITE NAME

SAMPLERS (PRINT/SIGNATURE)

LAB _____

COOLER _____ of _____

PAGE _____ of _____

BOTTLE TYPE AND PRESERVATIVE

DELIVERY SERVICE: _____ AIRBILL NO.: _____

TOTAL NO. # OF
CONTAINERS

REMARKS

SAMPLE TYPE

BEGINNING
DEPTH (IN FEET)

ENDING
DEPTH (IN FEET)

FIELD LOT NO. #
(IRPIMS ONLY)

LOCATION
IDENTIFIER

DATE

TIME

COMP/
GRAB

SAMPLE ID

MATRIX

MATRIX CODES

AA - AMBIENT AIR
SE - SEDIMENT
SH - HAZARDOUS SOLID WASTE

SL - SLUDGE
WP - DRINKING WATER
WW - WASTE WATER

WG - GROUND WATER
SO - SOIL
DC - DRILL CUTTINGS

WL - LEACHATE
GS - SOIL GAS
WC - DRILLING WATER

WO - OCEAN WATER
WS - SURFACE WATER
WQ - WATER FIELD QC

LH - HAZARDOUS LIQUID WASTE
LF - FLOATING/FREE PRODUCT ON GW TABLE

SAMPLE TYPE CODES

TB# - TRIP BLANK
SD# - MATRIX SPIKE DUPLICATE

RB# - RINSE BLANK
FR# - FIELD REPLICATE

N# - NORMAL ENVIRONMENTAL SAMPLE
MS# - MATRIX SPIKE

(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)

DATE

TIME

RECEIVED BY (SIGNATURE)

DATE

TIME

SPECIAL INSTRUCTIONS

RELINQUISHED BY (SIGNATURE)

DATE

TIME

RECEIVED FOR LAB BY (SIGNATURE)

DATE

TIME

Distribution: Original accompanies shipment, copy to coordinator field files

AECOM CONTACT:

[illegible]

DAILY DRILLING RECORD

AECOM

PROJECT TITLE: _____ DATE: _____

CLIENT: _____ CONTRACTOR: _____

FROM	TO	PRODUCTIVE HOURS	ACTIVITIES/COMMENTS
TOTAL PRODUCTIVE HOURS			LEVEL B / LEVEL C / LEVEL D (CIRCLE ONE SELECTION)

LABOR:		MATERIALS / SUPPLIES:	
UNITS		UNITS	

WEATHER:

_____	_____
AECOM ONSITE COORDINATOR	CONTRACTOR REPRESENTATIVE



TEST PIT LOG

PROJECT:		Sheet 1 of 1	
CLIENT: NYSDEC		JOB NUMBER:	
CONTRACTOR:		LOCATION: Brooklyn, New York	
DATE STARTED:		GROUND ELEVATION:	
DATE COMPLETED:		OPERATOR:	
TRENCH NUMBER:		GEOLOGIST:	
DEPTH (FT)	DESCRIPTION		
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
COMMENTS:			

										TEST BORING LOG	
PROJECT:										BORING NO:	
CLIENT:										SHEET: 1 of	
BORING CONTRACTOR:										JOB NO.:	
GROUNDWATER:										BORING LOCATION:	
					CAS.	SAMPLER	CORE	TUBE	GROUND ELEVATION:		
DATE	TIME	LEVEL	TYPE	TYPE					DATE STARTED:		
				DIA.					DATE FINISHED:		
				WT.					DRILLER:		
				FALL					GEOLOGIST:		
					* POCKET PENETROMETER READING				REVIEWED BY:		
DEPTH FEET	SAMPLE					DESCRIPTION			REMARKS		
	TIME	NO.	TYPE	BLOWS PER 6"	ROD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION			
5											
10											
15											
20											
25											
30											
COMMENTS:									PROJECT NO.		
									BORING NO.		

DRILLING SUMMARY		Top of Riser Ground Level Top of Seal Top of Sand Pack Top of Screen Bottom of Screen Bottom of Borehole feet feet feet feet feet feet feet feet feet feet feet feet feet feet Top of Casing Ground Level Schedule 40 PVC Casing Borehole Diameter Schedule 40 PVC Screen inch diameter feet length ID inches inch diameter feet length	
Geologist:			
Contractor:			
Operator:			
Model:			
Date:			
GEOLOGIC LOG		DEPTH	
Depth(ft.)	Description		
WELL DESIGN			
CASING MATERIAL		SCREEN MATERIAL	FILTER MATERIAL
Surface: 12" Steel protective cover (Stick Up)		Type: 4" Schedule 40 PVC	Type: #2 well sand
Monitor: 4" Schedule 40 PVC		Slot Size: 0.020"	Setting:
COMMENTS:		SEAL MATERIAL	
		Type 1: Bentonite chips	
		Setting:	
		LEGEND	
		Cement Grout Bentonite Seal Sand Pack	
Client: NYC		Location:	Project No.:
AECOM		MONITORING WELL CONSTRUCTION DETAILS	Well Number:

DRILLING SUMMARY		Top of Riser Ground Level Ground Level Schedule 40 PVC Casing _____ diameter _____ length Borehole Diameter _____ inches ID Top of Seal Top of Sand Pack Top of Screen Schedule 40 PVC Screen _____ diameter _____ length Bottom of Screen _____ feet Bottom of Borehole _____ feet	
Geologist:			
Contractor:			
Operator:			
Model:			
Date:			
GEOLOGIC LOG		D E P T H	
Depth(ft.)	Description		
WELL DESIGN			
CASING MATERIAL		SCREEN MATERIAL	
Surface:	Type: 1" Schedule 40 PVC	Type: Setting:	
Monitor:	Slot Size:	SEAL MATERIAL	
		Type 1: Setting: Type 2: Setting:	
COMMENTS:		LEGEND	
		Cement Grout Bentonite Seal Sand Pack	
Client:	Location:	Project No.:	
AECOM	PIEZOMETER CONSTRUCTION DETAILS	Well Number:	

DRILLING SUMMARY		Flush Mount Protective Casing Ground Level Top of Seal (ft bgs) DIRECT PUSH BOREHOLE 2.0 inch diameter feet length Top of Sand (ft. bgs) Top of Implant Screen (ft bgs) (ft bgs) Total Depth IMPLANT 0.25 internal diameter 0.5' length NOT TO SCALE	
Geologist:			
Drilling Company:			
Driller:			
Rig Make/Model:			
Date:			
GEOLOGIC LOG			
Depth(ft.)	Description		
WELL DESIGN			
CASING MATERIAL		SCREEN MATERIAL	FILTER MATERIAL
Surface: Steel grade box		Type: 6 inch stainless steel implant	Type: #2 Sand
Monitor: 3/8 inch OD polyethylene tubing		Pore Diameter: 0.007 inch	SEAL MATERIAL
			Type: Bentonite Slurry
COMMENTS:		LEGEND	
		Cement/Bentonite Grout Bentonite Seal Silica Sandpack	
Client: NYSDEC	Location:	Project No.:	
AECOM	SOIL VAPOR IMPLANT CONSTRUCTION DETAILS	Well Number:	

WELL DEVELOPMENT LOG

AECOM

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

		WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x ____)	=	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	0.75"	0.02
		OR	
		V=0.0408 x (CASING DIAMETER)²	

[illegible]

COMMENTS:	

WELL PURGING LOG

AECOM

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	_____	WELL ID. 1"	VOL. (GAL/FT) 0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	_____	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.00	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.00	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 3)	=	0.00	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	_____	8"	2.60
OR V=0.0408 x (CASING DIAMETER) ²				

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											

COMMENTS:

Remarks:



Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: _____ Site Code: _____ Operable Unit: _____

Building Code: _____ Building Name: _____

Address: _____ Apt/Suite No: _____

City: _____ State: _____ Zip: _____ County: _____

Contact Information

Preparer's Name: _____ Phone No: _____

Preparer's Affiliation: _____ Company Code: _____

Purpose of Investigation: _____ Date of Inspection: _____

Contact Name: _____ Affiliation:

Phone No: _____ Alt. Phone No: _____ Email: _____

Number of Occupants (total): _____ Number of Children: _____

☐ Occupant Interviewed?

☐ Owner Occupied?

☐ Owner Interviewed?

Owner Name (if different): _____ Owner Phone: _____

Owner Mailing Address: _____

Building Details

Bldg Type (Res/Com/Ind/Mixed): Bldg Size (S/M/L):

If Commercial or Industrial Facility, Select Operations:

If Residential Select Structure Type:

Number of Floors: _____ Approx. Year Construction: _____ ☐ Building Insulated? ☐ Attached Garage?

Describe Overall Building 'Tightness' and Airflows(e.g., results of smoke tests):

Foundation Description

Foundation Type: Foundation Depth (bgs): _____ Unit:

Foundation Floor Material: Foundation Floor Thickness: _____ Unit:

Foundation Wall Material: Foundation Wall Thickness: _____

☐ Floor penetrations? Describe Floor Penetrations: _____

☐ Wall penetrations? Describe Wall Penetrations: _____

Basement is: Basement is: ☐ Sumps/Drains? Water In Sump?:

Describe Foundation Condition (cracks, seepage, etc.) : _____

☐ Radon Mitigation System Installed? ☐ VOC Mitigation System Installed? ☐ Mitigation System On?

Heating / Cooling / Ventilation Systems

Heating System: Heat Fuel Type: ☐ Central A/C Present?

Vented Appliances

Water Heater Fuel Type: Clothes Dryer Fuel Type:

Water Htr Vent Location: Dryer Vent Location:



Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

PRODUCT INVENTORY

Building Name: _____ Bldg Code: _____ Date: _____

Bldg Address: _____ Apt/Suite No: _____

Bldg City/State/Zip: _____

Make and Model of PID: _____ Date of Calibration: _____

Location	Product Name/Description	Size (oz)	Condition *	Chemical Ingredients	PID Reading	COC Y/N?
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐

* Describe the condition of the product containers as **Unopened (UO)**, **Used (U)**, or **Deteriorated (D)**

** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Complete? ☐ Were there any elevated PID readings taken on site? ☐ ☐ Products with COC?



Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: _____ Site Code: _____ Operable Unit: _____

Building Code: _____ Building Name: _____

Address: _____ Apt/Suite No: _____

City: _____ State: _____ Zip: _____ County: _____

Factors Affecting Indoor Air Quality

Frequency Basement/Lowest Level is Occupied?: _____ Floor Material: _____

☐ Inhabited? ☐ HVAC System On? ☐ Bathroom Exhaust Fan? ☐ Kitchen Exhaust Fan?

Alternate Heat Source: _____ ☐ Is there smoking in the building?

☐ Air Fresheners? Description/Location of Air Freshener: _____

☐ Cleaning Products Used Recently?: Description of Cleaning Products: _____

☐ Cosmetic Products Used Recently?: Description of Cosmetic Products: _____

☐ New Carpet or Furniture? Location of New Carpet/Furniture: _____

☐ Recent Dry Cleaning? Location of Recently Dry Cleaned Fabrics: _____

☐ Recent Painting/Staining? Location of New Painting: _____

☐ Solvent or Chemical Odors? Describe Odors (if any): _____

☐ Do Any Occupants Use Solvents At Work? If So, List Solvents Used: _____

☐ Recent Pesticide/Rodenticide? Description of Last Use: _____

Describe Any Household Activities (chemical use,/storage, unvented appliances, hobbies, etc.) That May Affect Indoor Air Quality:

☐ Any Prior Testing For Radon? If So, When?: _____

☐ Any Prior Testing For VOCs? If So, When?: _____

Sampling Conditions

Weather Conditions: _____ Outdoor Temperature: _____ °F

Current Building Use: _____ Barometric Pressure: _____ in(hg)

Product Inventory Complete? ☐ Building Questionnaire Completed? ☐



Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Building Code: _____ Address: _____

Sampling Information

Sampler Name(s): _____ Sampler Company Code: _____

Sample Collection Date: Date Samples Sent To Lab: _____

Sample Chain of Custody Number: _____ Outdoor Air Sample Location ID: _____

SUMMA Canister Information

Sample ID:

Location Code:

Location Type:

Canister ID:

Regulator ID:

Matrix:

Sampling Method:

Sampling Area Info

Slab Thickness (inches):

Sub-Slab Material:

Sub-Slab Moisture:

Seal Type:

Seal Adequate?: ☐ ☐ ☐ ☐ ☐

Sample Times and Vacuum Readings

Sample Start Date/Time:

Vacuum Gauge Start:

Sample End Date/Time:

Vacuum Gauge End:

Sample Duration (hrs):

Vacuum Gauge Unit:

Sample QA / QC Readings

Vapor Port Purge: ☐ ☐ ☐ ☐ ☐

Purge PID Reading:

Purge PID Unit:

Tracer Test Pass: ☐ ☐ ☐ ☐ ☐

Sample start and end times should be entered using the following format: MM/DD/YYYY HH:MM



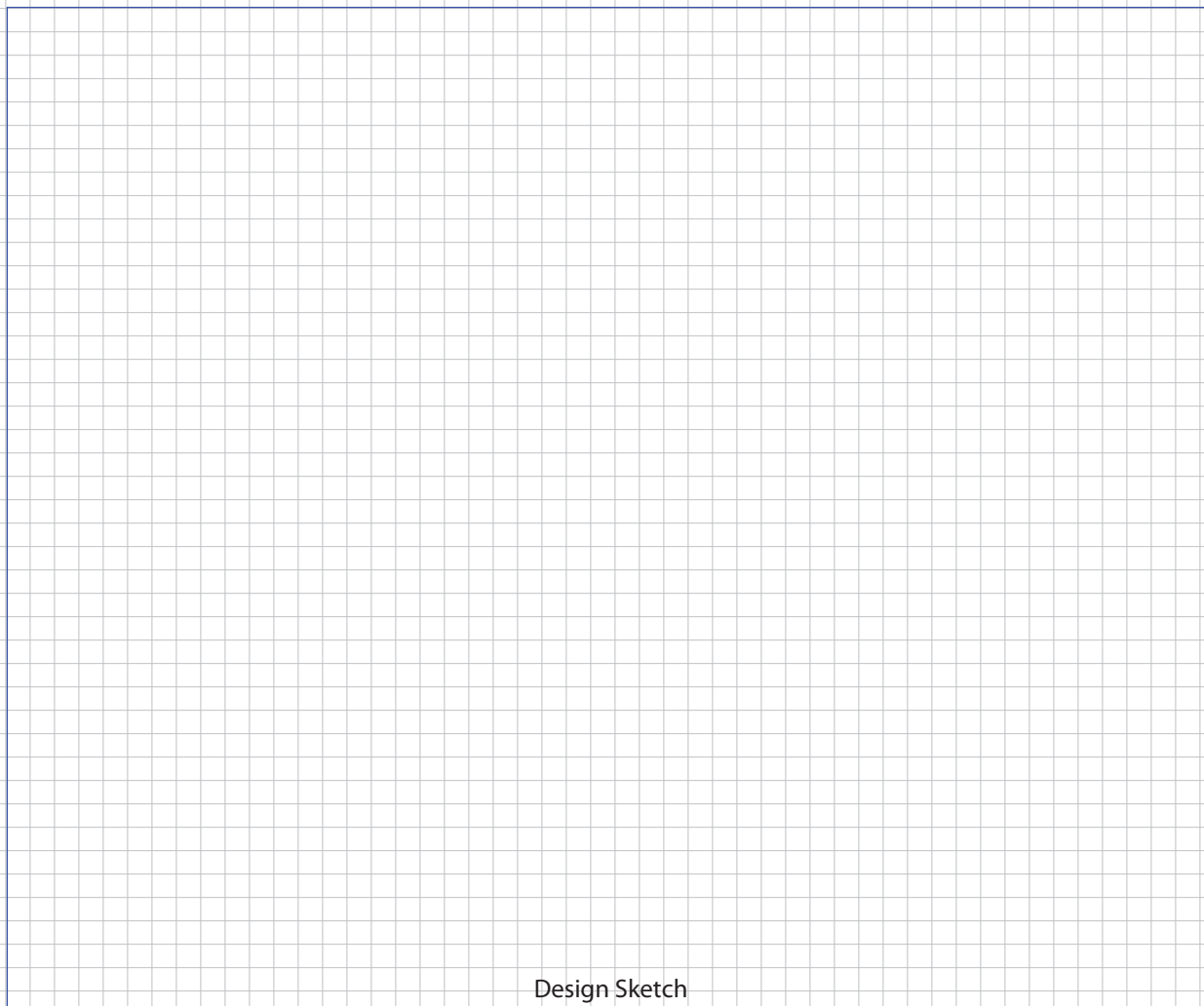
Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

LOWEST BUILDING LEVEL LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the lowest building level .
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image



Design Sketch

Design Sketch Guidelines and Recommended Symbolology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketch.
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or F	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	xxxxxxx	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	#####	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.



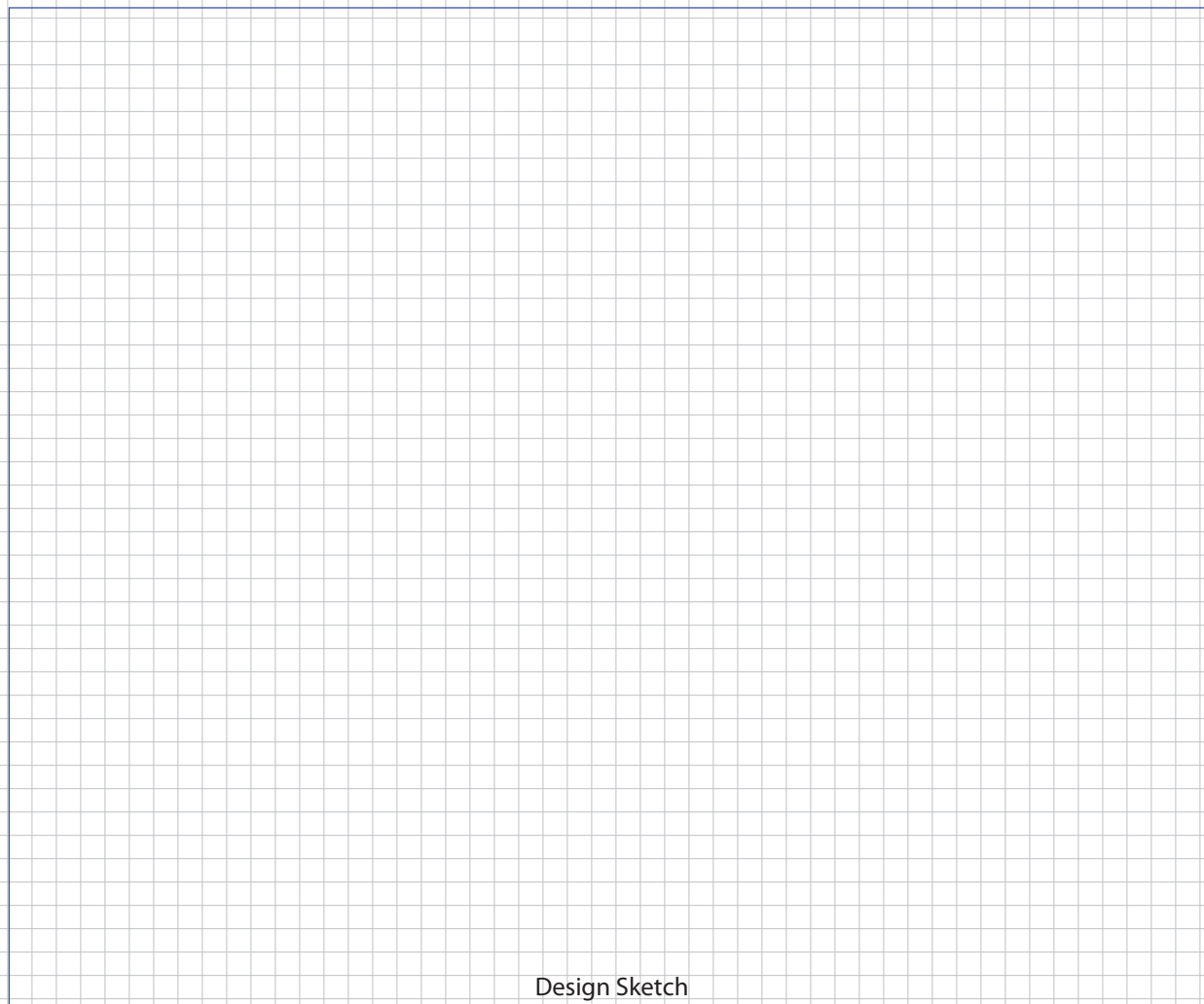
Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

FIRST FLOOR BUILDING LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the first floor of the building.
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image



Design Sketch

Design Sketch Guidelines and Recommended Symbology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
 - Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
 - Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketch.
 - Identify the locations of the following features on the layout sketch, using the appropriate symbols:
- | | | | |
|---------------|-------------------|----------|--|
| B or F | Boiler or Furnace | o | Other floor or wall penetrations (label appropriately) |
| HW | Hot Water Heater | xxxxxxx | Perimeter Drains (draw inside or outside outer walls as appropriate) |
| FP | Fireplaces | ##### | Areas of broken-up concrete |
| WS | Wood Stoves | ● SS-1 | Location & label of sub-slab samples |
| W/D | Washer / Dryer | ● IA-1 | Location & label of indoor air samples |
| S | Sumps | ● OA-1 | Location & label of outdoor air samples |
| @ | Floor Drains | ● PFET-1 | Location and label of any pressure field test holes. |



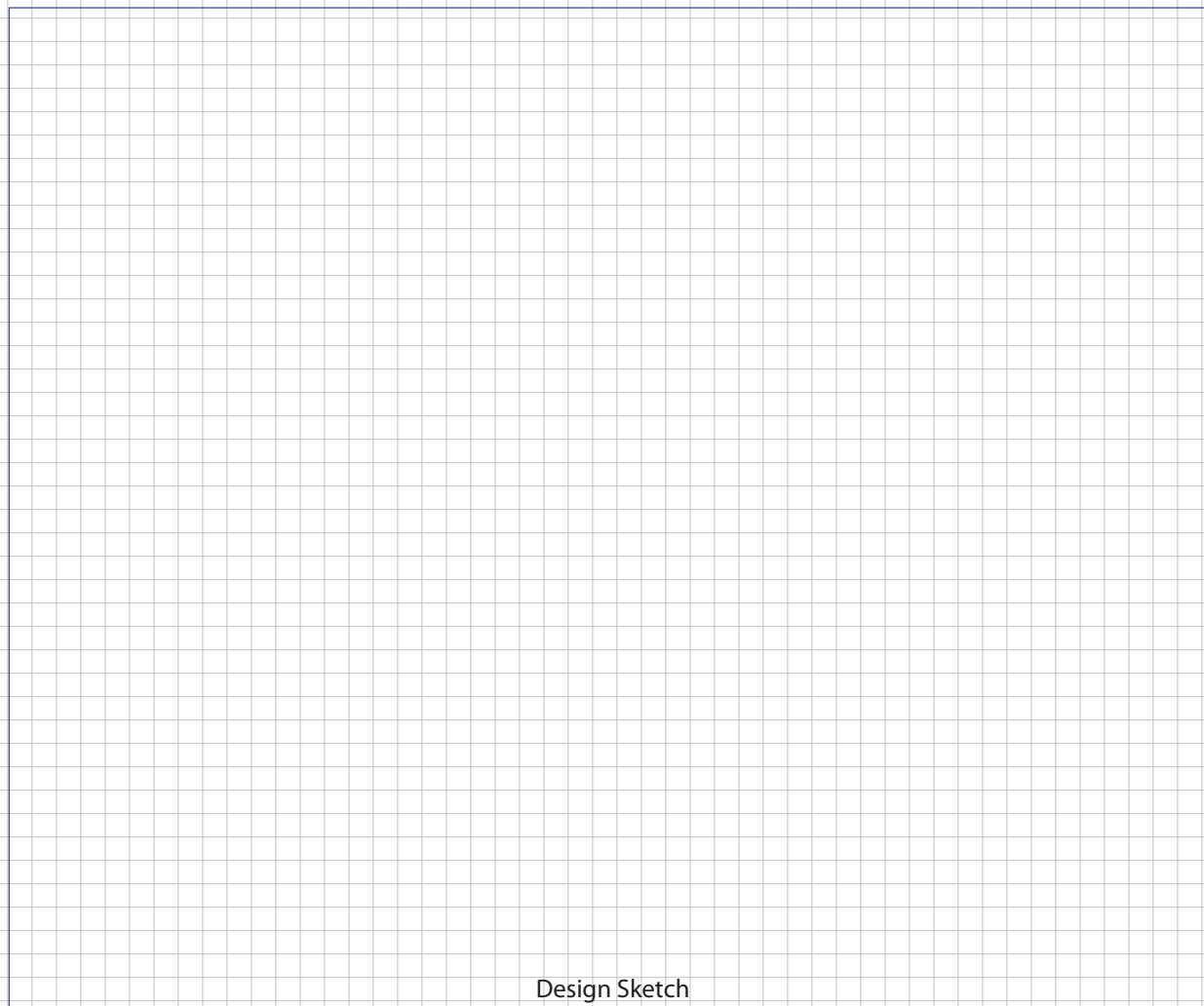
Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

OUTDOOR PLOT LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the outdoor plot of the building as well as the surrounding area. The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image



Design Sketch

Design Sketch Guidelines and Recommended Symbolology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketch.
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or F	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	xxxxxxx	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	#####	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

Summa Canister Data Sheet

Site:

Samplers:

Date:

Sample #					
Location					
Summa Canister ID					
Flow Controller ID					
Additional Tubing Added	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much
Purge Time (Start)					
Purge Time (Stop)					
Total Purge Time (min)					
Purge Volume					
Initial Tracer Gas Results					
CH4 (ppm)					
O2 (%)					
H2S (ppm)					
CO2 (ppm)					
Pressure Gauge - before sampling					
Sample Time (Start)					
Sample Time (Stop)					
Total Sample Time (min)					
Pressure Gauge - after sampling					
Sample Volume					
Canister Pressure Went To Ambient Pressure?	YES / NO	YES / NO	YES / NO	YES / NO	YES / NO
Final Tracer Gas Results					
Weather 24 hours before and during sampling					
General Comments:					

WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

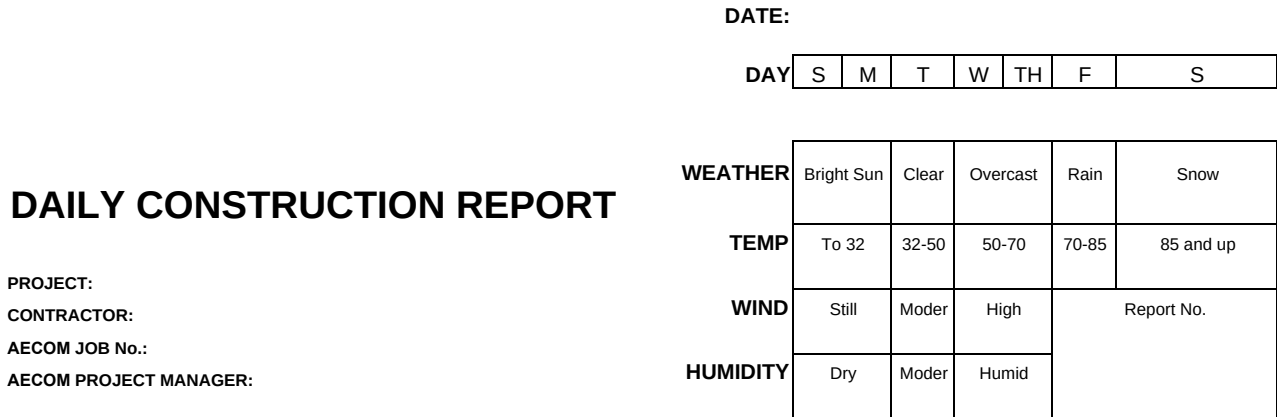
DECOMMISSIONING DATA (Fill in all that apply)		WELL SCHEMATIC*	
<u>OVERDRILLING</u>		Depth (feet)	
Interval Drilled			
Drilling Method(s)			
Borehole Dia. (in.)			
Temporary Casing Installed? (y/n)			
Depth temporary casing installed			
Casing type/dia. (in.)			
Method of installing			
<u>CASING PULLING</u>			
Method employed			
Casing retrieved (feet)			
Casing type/dia. (in)			
<u>CASING PERFORATING</u>			
Equipment used			
Number of perforations/foot			
Size of perforations			
Interval perforated			
<u>GROUTING</u>			
Interval grouted (FBLS)			
# of batches prepared			
For each batch record:			
Quantity of water used (gal.)			
Quantity of cement used (lbs.)			
Cement type			
Quantity of bentonite used (lbs.)			
Quantity of calcium chloride used (lbs.)			
Volume of grout prepared (gal.)			
Volume of grout used (gal.)			

COMMENTS:

* Sketch in all relevant decommissioning data, including:
interval overdrilled, interval grouted, casing left in hole,
well stickup, etc.

Drilling Contractor

Department Representative



Name of Contractor	Non-manual	Manual	Remarks

Time	Representing	Representing	Remarks

[illegible]

Title: _____
Title: _____

DAILY CONSTRUCTION REPORT (cont'd) **REPORT No.:** _____

REPORT No.:_____

PROJECT:

CONTRACTOR:

AECOM JOB No.:

DATE:

[illegible]

Sheet: of

By:

Title:

Reviewed by:

Title:

APPENDIX L OPERATION AND MAINTENANCE MANUAL

OPERATION AND MAINTENANCE PLAN

KERRY CHEMICAL COMPANY SITE

SITE # 4-13-001

TOWN OF HANCOCK, DELAWARE COUNTY, NEW YORK

PREPARED FOR:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DEPARTMENT OF ENVIRONMENTAL REMEDIATION

WORK ASSIGNMENT D009803-38

PREPARED BY:

AECOM USA, Inc.
One John James Audubon Parkway, Suite 220
Amherst, NY 14228
(716) 856-5636

OCTOBER 2022

INSPECTION OF SITE FEATURES

Drainage Channels include the stone lined channels on Site. The stone lining functions to prevent erosion and maintain tranquil (slow) flow of the collected stormwater.

Check for the following:

- Missing or displaced stones and areas of stressed vegetation.
- Woody vegetation growing in the channels.
- Signs of breaching of the channel walls.
- Accumulated debris in the channels.

Riprap Revetments include the riprap along the bank of Cadosia Creek. The riprap revetment functions to prevent erosion of the bank of the creek.

Check for the following:

- Missing or displaced stones and areas of stressed vegetation.
- Woody vegetation growing through the revetment.
- Accumulated debris along the revetment.

Access Road provides access to the site.

Check for the following:

- The condition of the road surface.
- Signs of ponding or erosion within the adjacent lined channels.
- Presence of overgrown vegetation that may require trimming or mowing.

Groundwater Monitoring Wells will be sampled as specified in the Section 4 of the SMP. During monitoring events, the wells should be inspected, including the condition of the riser and the turbidity of the water (i.e., the possible need for redevelopment). A monitoring well inspection form is included in Appendix F of the SMP. During routine inspections, the outside of the protective casing should be inspected for the following:

- Condition of lock and cover.
- Signs of damage to casing or collar.
- Condition of the weep hole from casing.
- Evidence of tampering.

Gates, Fences, and other Security Features should be fully inspected at each visit to ensure that no unauthorized access is occurring to the site. Additionally, signs of other site usage should be noted.

Check for the following:

- Cutting or bending of fence fabric
- Missing locks, hinges, etc. from gates
- ATV, motorbike or snowmobile tracks
- Shotgun shell or bullet casings
- Cans or other trash
- Other signs of unauthorized access or vandalism

ROUTINE MAINTENANCE

Debris Removal shall be performed at each scheduled maintenance visit. Debris includes large branches, sticks, rocks, or trash that could accumulate in the stone lined channels and impair their function.

Mowing of grassed areas shall be performed on an as-needed basis.

Groundwater Monitoring Wells. Routine maintenance activities for Groundwater Monitoring Wells include the following:

- Maintain access to the well and control surrounding vegetation, weeding, etc. No herbicides or pesticides may be used without written approval by the NYSDEC.
- Replace damaged well caps and locks to keep out rodents and prevent unauthorized access.
- Extend or repair well casing if required.
- Replace well identification tag if missing or unreadable.
- Install or repair protective bollards for wells located in high-traffic areas.
- Rehabilitate and clear well of accumulated sediment if required.

INTERMITTENT MAINTENANCE

Like routine maintenance measures, intermittent maintenance measures can be anticipated to be necessary during the post-closure maintenance period. Unlike routine maintenance measures, however, the necessary frequency or schedule of these measures cannot be anticipated. They should be performed on an as-needed basis only, when indicated by the results of the routine site inspections.

In all cases, the following paragraphs address only the basic maintenance procedures necessary to repair the problem. All work should be performed to the same standards and quality as outlined in the original construction specifications, unless otherwise deemed necessary for successful maintenance. The cause of the problem must be identified and addressed in the maintenance corrective action. The corrective action must be appropriate and intended to minimize the likelihood that the problem will

reoccur. Elimination of the cause may require a greater amount of work than simply repairing the problem area with the specified routine maintenance procedure.

CONTINGENCY MAINTENANCE

Should any problem occur that is not addressed in the previous paragraphs, contingency maintenance measures must be taken:

1. Within 48 hours of detection, as appropriate, notify the individuals listed in Appendix C of the SMP of the nature of the problem.
2. Perform temporary corrective measures as soon after detection as possible to keep the problem from worsening.
3. Within 7 days of detection, prepare and distribute a Corrective Action Plan that addresses the following:
 - The nature and extent of the problem
 - The apparent cause of the problem
 - Temporary corrective measures taken
 - Recommended corrective action
 - Recommended schedule of implementation
 - Recommended monitoring schedule for repaired area

The Plan must be submitted to all of the individuals identified in Appendix C of the SMP. Within an additional 7 days, all appropriate parties shall agree upon the Action Plan and its schedule of implementation. The contingency action will be monitored and reported in accordance with the requirements of the approved Corrective Action Plan.

RECORD KEEPING AND REPORTS

Standardized forms shall be used to record the results of inspections, monitoring and maintenance activities. These forms are included in Appendix J of the SMP.