

**KORKAY, INC.
FULTON COUNTY
BROADALBIN, NEW YORK**

SITE MANAGEMENT PLAN

NYSDEC Site Number: 518014

Prepared for:
New York State
Department of Environmental Conservation
625 Broadway, Albany, NY 12233

Prepared by:
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518-951-2200

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

NOVEMBER 2016

CERTIFICATION STATEMENT

I, Daniel T. Servetas, certify that I am currently a NYS registered professional engineer as 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) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.



Daniel T. Servetas, P.E.
License Number 079068

In accordance with New York State Education Law, it is a violation for any person, unless he is acting under the direction of a licensed professional engineer, to alter this Site Management Plan in any way.

**Korkay, Inc.
Fulton County
Broadalbin, New York**

SITE MANAGEMENT PLAN

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List of Acronyms

AST	Aboveground Storage Tank
ASW	Air Sparge Well
AWQ	Ambient Water Quality
CDM	Camp, Dresser, and McKee
COC	Certificate of Completion
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
Ft BGS	Feet Below Ground Surface
GW	Groundwater
IC	Institutional Control
IDW	Investigative Derived Waste
IRM	Interim Remedial Measure
ISCO	In Situ Chemical Oxidations
Korkay	Korkay, Incorporated
MW	Monitoring Well
NOD	Natural Oxidant Demand
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
OM&M	Operation, Maintenance and Monitoring
PPE	Personal Protective Equipment
PRR	Periodic Review Report
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSO	Remedial System Optimization
SCGs	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
S/GVs	Standards and Guidance Values
SMP	Site Management Plan
SVE	Soil Vapor Extraction
SVOC	Semi-volatile Organic Compound
TOGS	Technical and Operational Guidance Series
UST	Underground Storage Tank
VEW	Vapor Extraction Well
VOC	Volatile Organic Compound

ES EXECUTIVE SUMMARY

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

Site Identification:	#518014 Korkay, Inc. Broadalbin, New York	
Institutional Controls:	1. The property may be used for commercial or industrial use.	
	2. ICs include land and groundwater use restrictions.	
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP.	
Engineering Controls:	1. Monitoring Well Network	
Inspections:		Frequency
Monitoring well network		Annually
Monitoring:		
1. Groundwater monitoring wells MW-8D, MW-8S, MW-15D, MW-15S, MW-16D (<i>formerly 'FLUSHMOUNT'</i>), K-2, K-3, VEW-1, VEW-2, VEW-3, VEW-4, MW-19, MW-20 and MW-24.		Every five quarters
2. Groundwater monitoring wells ASW, MW-17, MW-18, MW-21, MW-22 and MW-23.		Quarterly (<i>through fall 2017, or longer</i>), plus every five quarters
Maintenance:		
1. Monitoring well maintenance		As needed
Reporting:		
1. Periodic Review Report		Annually, or otherwise as specified by DEC
2. Site Inspection Report		Annually

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

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Korkay, Inc. site located in Broadalbin, New York (hereinafter referred to as the “Site”), as shown on **Figure 1**. The Site is currently in the New York State (NYS) Superfund Program as Site No. 518014 which is administered by New York State Department of Environmental Conservation (NYSDEC).

A figure showing the Site location and its boundaries 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 and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Notice granted to the NYSDEC, and recorded with the Fulton County Clerk, requires compliance with this SMP and all ICs/ECs 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 Environmental Notice. 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,; and,
- Failure to comply with this SMP is also a violation of ECL, 6NYCRR Part 375, and thereby subject to applicable penalties.

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

This SMP was prepared by AECOM Technical Services Northeast, 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 SMP 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

Revisions to this plan will be proposed in writing to the NYSDEC’s project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. In accordance

with the Environmental Notice for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

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

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the Environmental Notice, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to an Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

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

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

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

Table 1: Notifications*

Name	Contact Information
Payson Long, NYSDEC Project Manager	518-402-9813, payson.long@dec.ny.gov
Russ Huyck, NYSDEC Region 5 Remediation Engineer	(518) 897-1241 Russell.Huyck@dec.ny.gov
Site Control Section, NYSDEC	(518) 402-9543, Kelly.Lewandowski@dec.ny.gov
Joseph Zalewski, Region 5 Engineer	(518) 897-1241, joseph.zalewski@dec.ny.gov

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

2.0 SUMMARY OF PREVIOUS REMEDIAL INVESTIGATIONS AND ACTIONS

2.1 Site Location and Description

The Site is located in Broadalbin, Fulton County, New York and is identified as Section 137.15 Block 5 and Lot 25 on the Fulton County Tax Map (see **Appendix A**). The Site is an approximately 0.9-acre area and is bounded by residential and commercial properties to the north, east and west, and by West Main Street to the south (see **Figure 2**). The boundaries of the Site are more fully described in **Appendix A – Environmental Notice**.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of an open grassy field. The Site is zoned industrial and is currently subjected to land and groundwater use restrictions mandated by the Environmental Notice

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

2.2.2 Geology

Geologic cross sections are illustrated in Figures 5 and 6 in the *Periodic Review Report* (PRR) (AECOM, 2014a) provided as **Appendix C**. Site specific boring logs are provided in **Appendix D**. The subsurface soil is a fine to coarse sand with some silt that becomes finer with depth. The sand and silt grades to a clay unit which generally dips from north to south with some variability.

2.2.3 Hydrogeology

Groundwater elevation data and contouring are illustrated in Figure 2 of the PRR (AECOM, 2014a) provided as **Appendix C**. Depth to groundwater ranges between 7 and 11 feet below ground surface (ft bgs). Historically, shallow groundwater has been reported to flow from north to south. Results from a July 2014 investigation suggest that the groundwater may flow southwest and west. The 1988 Remedial Investigation Report characterized the clay unit as an aquitard which prevents or limits downward migration of impacted groundwater.

2.3 Investigation and Remedial History

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

Korkay, Incorporated (Korkay) was a supplier of detergents, solvents, and degreasers to the automotive industry from 1969 to 1980. Korkay purchased bulk quantities of chemicals that were stored on-site for repackaging and/or blending into commercial products including automobile wax, and hand cleaners. In addition to the commercial products being produced, Korkay also operated as a drum reclamation facility. Drums were accepted containing a variety and quantity of chemicals that remains undetermined. The drums were emptied of any remaining chemicals, washed, rinsed and relined. This process was conducted without appropriate

containment of the chemicals, and chemical laden rinsate being discharged through the facilities septic system or directly to the ground surface. The NYSDEC and NYSDOH inspected the Site in 1979 and documented the occurrence of these activities. In 1980, Korkay installed a 4,000 gallon above ground storage tank (AST) to appropriately contain the residual chemicals and rinsate generated from drum reclamation. Reports and Site documentation indicate that the drums contained acetone, isopropyl alcohol, degreasers, and perfumes as well as other chemicals. Additionally, three underground storage tanks (USTs) were used for storage of fuel oil and chemicals. The approximate locations of the USTs are shown in a figure taken from the 1994 Remedial Investigation Report (CDM, 1994). A copy of this figure is included in **Appendix E**.

The NYSDEC conducted a Site inspection in 1992, at which time numerous drums of hazardous waste were found and secured for removal. Between 1993 and 1995, Camp, Dresser, and McKee (CDM) conducted a Remedial Investigation (RI) and Feasibility Study (FS) of the Site. The first phase of the RI, conducted from September 1993 until April 1994, included the collection of surface and subsurface soil samples and the installation and sampling of monitoring wells. The second phase of the RI, conducted between October 1994 and May 1995, included the collection of additional soil samples to delineate vertical extent of contamination and background levels and the collection of a second round of groundwater samples. Data from the RI were presented in a Final Phase I RI Report (CDM, 1994) and Final Phase II RI Report (CDM, 1995a). Evaluations of remedial alternatives were presented in a Final FS (Detailed Analysis) Report (CDM 1995b). Following submission of the FS, a Record of Decision (ROD) was issued by the NYSDEC in March 1996.

The elements of the remedy are:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the RI/FS will be resolved during remedial design/construction.
- Excavation and off-site disposal of approximately 145 cubic yards of contaminated surface soil.
- Backfilling excavated areas with clean fill that will be compacted, graded and covered with vegetation to reduce infiltration and rainwater and reduce erosion.
- Conduct Vapor Extraction (SVE) (with optional air sparging or site dewatering) for a period of up to six months. The SVE system will be conducted in Area 1, the alcove area with the highest contamination level.
- The site owner will be asked to impose deed restriction to exclude the use of site groundwater for residential or industrial use. Failing this, a deed notification will be filed with the county clerk's office.
- Demolition and disposal of building.
- Annually monitor, for a period of five years, the groundwater from two wells for VOCs, SVOCs, and pesticides. The site will be reevaluated at the end of the five year period to determine the effectiveness of the remedy performed.

Building demolition and excavation, and off-site disposal, of contaminated soils occurred between April and August 1997. Operation of a soil vapor extraction (SVE) system began in November 1998. In July 2000, the contract with CDM expired and the NYSDEC assumed

responsibility for Site operations. The NYSDEC discontinued operation of the SVE system in 2003.

Post remediation groundwater sampling results indicated that groundwater in the former source area remained contaminated in excess of applicable standards. A remedial system optimization (RSO) study was initiated in 2007 in order to determine the most effective mechanism to address the groundwater contamination. The RSO study determined that although the remediation efforts were effective at reducing Site contamination, subsurface and groundwater impacts still existed. The RSO included a focused FS (FFS) which evaluated remedial alternatives to address residual impacts to soil and groundwater. The FFS recommended further excavation and off-site disposal along with continued groundwater monitoring and imposition of a deed restriction.

In March 2010, a groundwater sampling event occurred at the Site as documented in the March 2010 Groundwater Monitoring Report (AECOM, 2010). Review of the shallow groundwater data demonstrated that groundwater contamination at the Site persisted in some of the same areas discussed in the 1995 RI report, primarily beneath the southwestern quadrant of the Site. Groundwater results from the deep wells at the Site continued to be below New York State Ambient Water Quality Standards and Guidance Values (NYS AWQ S/GV), most likely a result of the confining clay unit that underlies the Site at approximately 12 to 14 ft bgs. A summary of the groundwater sampling data is provided in **Appendix F**, Table 1.

Additionally in March 2010, 28-soil borings were installed at the Site to further characterize and delineate soil impacts in preparation for the soil removal activities prescribed in the FFS. Samples were analyzed for VOCs and compared to the Unrestricted Use Soil Cleanup Objectives (SCOs) from 6 NYCRR Subpart 375-6 (December 14, 2006). The field data and laboratory data collected as part of this investigation indicated that widespread subsurface soil impacts remained at the Site (Figure 4 in **Appendix C**) in comparison to the FFS. Observations of impacted soil, in the form of odor, elevated PID readings and/or contaminant staining was identified in several borings below a depth of 5 to 6 feet bgs. No such impacts were observed in any borings at depths less than 2 to 4 bgs. Based on this data, subsurface soil across approximately 35,000 square feet (ft) of the Site may be impacted above Standards, Criteria and Guidance values (SCGs). Using the excavation approach recommended in the FFS with the data collected in 2010, approximately 7,600 cubic yards of soil from ground surface to 6 ft bgs would need to be excavated and reused on-site as fill and 11,500 cubic yards of soil below 6 ft bgs would need to be shipped offsite for disposal.

In January 2012, a five-quarter groundwater sampling event occurred as documented in the *Groundwater Monitoring Report, January 2012* (AECOM, 2013a). Review of the shallow groundwater data demonstrated that groundwater contamination persisted in some of the same areas as discussed in the 1994 RI report, primarily beneath the southwest quadrant of the Site, in the former source area; groundwater results from the deep wells at the Site continued to be below NYS AWQ S/GV. Similarly, data from the next 5-quarter groundwater monitoring event conducted in June 2013 (AECOM, 2013b) showed continued presence of contaminated groundwater in the areas observed in January 2012. The 2012 and 2013 data is presented in **Appendix F**, Table 1.

In July 2014, a direct-push groundwater investigation was completed at the Site to further delineate and characterize the dissolved-phase groundwater impacts, and to collect soil samples for analysis of persulfate natural oxidation demand (PNOD) to evaluate the effectiveness of using an oxidant for in-situ remediation of contaminated soil and groundwater at the Site. Groundwater samples were collected from 23 direct-push borings (GW-1 to GW-23) and analyzed for VOCs, semi-volatile organic compounds (SVOCs), and organochlorine pesticides. The extent of dissolved-phase groundwater impacts was reviewed in the AECOM July 2014 Investigation Summary (AECOM, 2014b). The groundwater and soil impacts off-site were not fully defined and

the top five feet of soil was found not impacted except where staining and/or odors were noted below a depth of 2 feet bgs in 2 borings installed near the source areas. In borings completed to the top of the clay, staining and odors were noted through the saturated soil to the top of the clay. Test boring logs from this investigation are included in **Appendix D. Appendix F** (Tables 2, 3, and 4) detail the 2014 investigation results.

In August 2015, a second direct-push groundwater investigation was completed to further delineate and characterize the off-site groundwater plume, and provide the data to select locations for additional permanent monitoring wells. Groundwater samples were collected from 14 direct-push borings (GW-24 through GW-37) and analyzed for VOCs, semi-volatile organic compounds (SVOCs), and organochlorine pesticides. The extent of dissolved-phase groundwater impacts was reviewed in the AECOM 2015 Direct-Push Groundwater Investigation Summary (AECOM, 2015).

A supplemental remedial action, approved by NYSDEC, consisting of in-situ chemical oxidation (ISCO) injection was conducted in October, 2015. The purpose of the ISCO injection was to attempt to further remediate residual soil and groundwater contamination to meet the remedial goals established for the Site. The remediation included the installation of 95 injection points. The points were installed with a direct push Geoprobe® unit. The oxidant that was used was activated persulfate, specifically, PersulfOx from Regenesis Remediation Services. This oxidant has been shown to effectively reduce the mass of the VOCs present at the Site, and has been shown to degrade some pesticides as well. PersulfOx is a catalyzed persulfate which does not require any additional activation. The PersulfOx was applied concurrently with oxygen release compound Advanced (ORC-A), a product that provides a sustained release of oxygen which will allow for polishing of COCs through aerobic bioremediation.

2.4 Remedial Action Objectives

Goals for the remedial program have been established through the remedy selection process stated in 6NYCRR Part 375-1.10. These goals are established under the overall goal of meeting SCGs and protecting human health and the environment. At a minimum, the remedy selected should eliminate or mitigate all significant threats to the public health and to the environment presented by hazardous waste disposed at the Korkay site through the proper application of scientific and engineering principles. The Remedial Action Objectives (RAOs) for the Site are the Remediation Goals established for the Site in the ROD, dated March 1996, and presented below.

1. To eliminate, to the greatest extent possible, on-Site soils as a source of groundwater contamination; and
2. To eliminate or reduce human exposure to on-Site soils contamination.

2.5 Remaining Contamination

2.5.1 Soil

Field and lab data collected as part of the March 2010 and July 2014 investigations indicated widespread subsurface soil impacts at the Site (Table 1 and Figure 4 in **Appendix C**). Approximately 35,000 square feet of the Site may be impacted above Unrestricted Use SCOs. Observations of impacted soil, in the form of odor, elevated PID readings and/or contaminant staining was identified in several borings below a depth of 5 to 6 feet bgs. No such impacts were observed in any borings at depths less than 2 to 4 bgs. On-site impacted soil is currently managed by an Environmental Notice for the Site, filed with Fulton County on January 25, 2013, detailed in **Appendix A** of this SMP. ICs are enforced by the Environmental Notice include land-

use restriction. The data indicates that uncontaminated soil exists at the Site to a depth of at least 2 feet bgs, NYSDEC removed the eastern and southern sides of the Site fence in October, 2015, and Site access is no longer restricted. Since contaminated soil does still exist at the site, excavation or disturbance of the soil below the top 2 feet will require implementation of an approved excavation work plan, such as that provided in **Appendix G**.

2.5.2 Groundwater

The analytical results from the July 2014 and August 2015 groundwater investigations were evaluated for NYS AWQ S/GV exceedances (Tables 2 through 7 in **Appendix F**) and illustrated in **Figure 3**. The extent of dissolved-phase groundwater impacts on-site and off-site was observed to be greater than previous groundwater investigations and monitoring suggested. The on-site area of impacted groundwater covers about two-thirds of the Site and is currently managed under the Environmental Notice for the Site (**Appendix A**). ICs enforced by the Environmental Notice include groundwater use restriction. The groundwater impacts off-site were not fully defined during these investigations.

Figure 3 shows the projected off-site groundwater plume configuration based on the results of the August 2015 groundwater investigation and shows the locations proposed for 8 new monitoring wells. With NYSDEC approval, the 8 wells (MW-17 through MW-24) were installed in September 2015. A copy of the soil boring and well construction logs for these wells is included in **Appendix D**. The location of the 8 new wells, along with the 12 pre-existing wells, are shown on **Figure 4**. The 8 new wells will be monitored as part of the Monitoring and Sampling Plan included in Section 4.0 of this SMP.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

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

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental 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 Section 3.0 of AECOM's March 2014 PRR (**Appendix C**) and the EWP (**Appendix G**) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

ICs at the Site currently consist of an Environmental Notice filed with the Fulton County Clerk on January 25, 2013 (**Appendix A**). A series of ICs is required by the Environmental Notice to: (1) implement, maintain and monitor EC systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to commercial and industrial uses only. 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 equivalent with the Site boundary shown on **Figure 2**. These ICs are:

- The property may only be used for commercial or industrial use;
- There shall be no excavation or disturbance of the property which threatens the integrity of the ECs ;
- No person shall disturb, remove or otherwise interfere with the installation, use, operation and maintenance of engineering controls required for the remedy;
- All ECs must be inspected at a frequency and in a manner defined in this SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYS Department of Health (DOH) or the Fulton

County DOH 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; and
- 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.

3.3 Engineering Controls

ECs for the Site are limited to maintaining the integrity of the groundwater monitoring wells so they remain reliable for collecting representative samples to monitor groundwater contaminant concentrations. Inspection of the monitoring wells will be conducted on at least an annual basis during Site-wide inspection, as described in Section 4.2.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of Site management for the Site are included in the Quality Assurance Project Plan (QAPP) 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, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC SCGs, particularly groundwater standards and Part 375 SCOs for soil; 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 annually. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, inspection forms will be completed as provided in **Appendix J** – Site Management Forms. The forms will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;

- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site records are up to date.

Inspections of all remedial components installed at the Site will be conducted. A comprehensive Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the PRR. 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 must be given by noon of the following day. In addition, an inspection of the Site will be conducted within five days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within seven days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater on a routine basis. Sampling locations, required analytical parameters and schedule are provided in **Table 2** – Post Remediation System Sampling Requirements and Schedule, below. As indicated in **Table 2**, 6 wells will be monitored on a quarterly basis to generate the data necessary to evaluate the effectiveness of the ISCO injection program conducted in October, 2015. The post-ISCO quarterly groundwater monitoring will be conducted for two years (through fall 2017), but will be extended if necessary. In addition, all 20 monitoring wells will be sampled every five-quarters to monitor plume conditions. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 2 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters			Schedule
	VOCs (Method 8260B)	SVOCs (Method 8270C)	Organochlorine Pesticides (Method 8081A)	
VEW-1	X	X	X	Every five quarters
VEW-2	X	X	X	
VEW-3	X	X	X	
VEW-4	X	X	X	
K-2	X	X	X	
K-3	X	X	X	
MW-8D	X	X	X	
MW-8S	X	X	X	
MW-15D	X	X	X	
MW-15S	X	X	X	
MW-16D (formerly 'FLUSHMOUNT')	X	X	X	
MW-19	X	X	X	
MW-20	X	X	X	
MW-24	X	X	X	
ASW	X	X	X	Quarterly (through Fall 2017 or longer) plus every five quarters.
MW-17	X	X	X	
MW-18	X	X	X	
MW-21	X	X	X	
MW-22	X	X	X	
MW-23	X	X	X	

Detailed sample collection and analytical procedures and protocols are provided in **Appendix I** – Quality Assurance Project Plan and **Appendix K** – Field Activities Plan.

Groundwater sample locations will be based on their proximity to the currently delineated plume. Existing monitoring wells (**Figure 4**) will be used to collect groundwater samples. Groundwater samples will be collected as grab samples with a peristaltic pump fitted with dedicated tubing purged with low flow methodology and analyzed for VOCs (Method 8260C), SVOCs (Method 8270D), Organochlorine Pesticides (Method 8081B).

Investigative Derived Waste (IDW) generated during groundwater sampling will be managed and includes, but is not limited to, spent personal protection equipment (PPE), groundwater, and disposable sampling equipment. Groundwater from purging the wells or sampling will be discharged to the ground in the vicinity of the extraction location. If a sheen or odor is noted in the water it will be containerized in a 55-gallon steel drum for off-site disposal. PPE and disposable sampling equipment generated during Site activities will be bagged and properly disposed of.

Groundwater sampling reports resulting from these activities will be submitted as indicated in Section 7.0- Reporting. Subsections 4.3.1 and 4.3.2 discuss groundwater sampling in detail.

4.3.1 Groundwater Sampling

Groundwater monitoring will be performed in accordance with the schedule in **Table 2** to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of groundwater monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the Site (**Figure4**). The network of on-Site and off-Site wells has been designed based on their proximity to the currently delineated plume and their relationship to the Site boundary.

Table 3 summarizes the well identification numbers, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, 20 wells are sampled to evaluate the effectiveness of the remedial system.

Table 3 – Monitoring Well Construction Details

Monitoring Well ID	Well Location	Well Diameter (inches)	Elevation (above mean sea level)			
			Well Casing (Riser)	Ground Surface	Screen Top	Screen Bottom
ASW	On-site	2	817.44	817.89	807.89	805.89
VEW-1	On-site	2	816.99	817.43	813.13	808.13
VEW-2	On-site	2	816.99	817.42	813.02	808.02
VEW-3	On-site	2	817.74	818.10	814.10	809.10
VEW-4	On-site	2	817.49	817.88	814.08	809.08
K-2	On-site	2	816.98	817.38	Not available	
K-3	On-site	2	817.23	817.40	Not available	
MW-8D	Down-gradient	2	816.02	816.24	771.24	761.24
MW-8S	Down-gradient	2	816.04	816.14	810.14	805.14
MW-15D	On-site	2	816.13	816.50	786.50	776.50
MW-15S	On-site	2	816.02	816.59	811.59	806.59
MW-16D (formerly FLUSHMOUNT)	On-site	2	817.08	817.38	772.38	762.38
MW-17	On-site	2	816.23	816.57	811.57	801.57
MW-18	On-site	2	817.15	817.35	812.35	802.35
MW-19	Down-gradient	2	809.28	809.65	804.65	799.65
MW-20	Down-gradient	2	813.82	814.21	810.21	800.21
MW-21	Down-gradient	2	816.19	816.59	809.59	804.59
MW-22	On-site	2	815.82	816.13	811.13	806.13
MW-23	On-site	2	817.21	817.40	812.40	802.40
MW-24	Cross-gradient	2	817.48	817.80	810.80	805.80

Monitoring well construction logs are included in **Appendix D** of this document.

If biofouling or silt accumulation occurs in network monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

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

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

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

4.3.2 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, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the Site-specific Field Activities Plan provided as **Appendix K** of this document.

5.0 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.

In the event that an enclosed building were to be constructed on the Site, a soil vapor intrusion (SVI) study would first be required to determine the potential for soil vapor to impact indoor air quality. Depending on the results of the study, the NYSDOH may require the building to be constructed with a sub-slab depressurization system.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

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

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

- Evaluation of Site susceptibility to flooding and identification of Site proximity to flood plains, low-lying or low-groundwater recharge areas;
- Assessment of Site drainage and storm water management prone to flooding;
- Identify evidence of erosion at the Site or areas of the Site which may be at risk to erosion during periods of severe rain events;
- Evaluate areas of the Site and ECs which may be susceptible to damage from high winds or debris generated during periods of high wind; and
- Assess areas of the Site which may be at risk to a spill or other contaminant release due to storm-related damage caused by flooding, erosion, high winds, loss of power etc.

Areas identified as vulnerable will be photographed and reported in the assessment.

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 PRRs.

Site management items that will be considered for implementing green remediation concepts and techniques may include:

- Waste Management: Reducing waste generation volume and identifying disposal options with less than conventional environmental impacts;
- Energy Usage: Evaluating options to supplement energy usage with renewable energy sources;

- Emissions: Assessing use of equipment and materials with reduced emission generation, including transportation and equipment support for site inspections;
- Water Usage: Identify opportunities to reduce water usage; and
- Land/Ecosystem Disturbance: Identify land and/or ecosystems vulnerable to environmental impacts generated from site management activities and assess options to reduce impacts such as minimizing groundwater infiltration during storm events.

Methods proposed to reduce site management items including those listed above will be reported in PRRs.

6.2.1 Timing of Green Remediation Evaluations

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

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

6.2.2 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct system checks and or collect samples and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources. SMP activities that may be consolidated to reduce energy or resource use include media sampling and site visits/EC checks. Use of remote sensing/operations and telemetry, consolidation of activities, and consideration of mass transit may also be considered where available.

6.2.3 Metrics and Reporting

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

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

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

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of **Table 4** and summarized in the PRR.

Table 4: Schedule of Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Annually
Groundwater Monitoring reports	Within 90 days after sampling event
Periodic Review Report	Annually or as otherwise specified by DEC

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

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

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

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

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

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

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

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

7.2 Periodic Review Report

A PRR will be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the Site is subdivided into separate parcels with different ownership, a single PRR 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 PRR. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site;
- Results of the required annual Site inspections and severe condition inspections, if applicable;
- All applicable site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted;

- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQulS™ database in accordance with the requirements found at this link: <http://www.dec.ny.gov/chemical/62440.html>; and
- A Site evaluation, which includes the following:
 - The compliance of the remedy with the requirements of the ROD;
 - 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;
 - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the ROD; 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 in New York State will prepare, and include in the PRR, 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 am certifying as the NYSDEC's Representative for the Site."

The signed certification will be included in the PRR.

The PRR will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The PRR may need to be submitted in hard-copy format, as 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, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

8.0 REFERENCES

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

AECOM, 2010, *Groundwater Monitoring Report, March 2010*, June.

AECOM, 2013a, *Groundwater Monitoring Report, January 2012*, March.

AECOM, 2013b, *Groundwater Monitoring Report June 25, 2013 5-Quarter Sampling Event*, October.

AECOM, 2014a, *Periodic Review Report*, March.

AECOM, 2014b, *July 2014 Investigation Summary*, November.

AECOM, 2015 *Direct-Push Groundwater Investigation Summary*, October.

CDM, 1994. *Final Remedial Investigation*, April.

CDM, 1995a. *Final Phase II Remedial Investigation*, August.

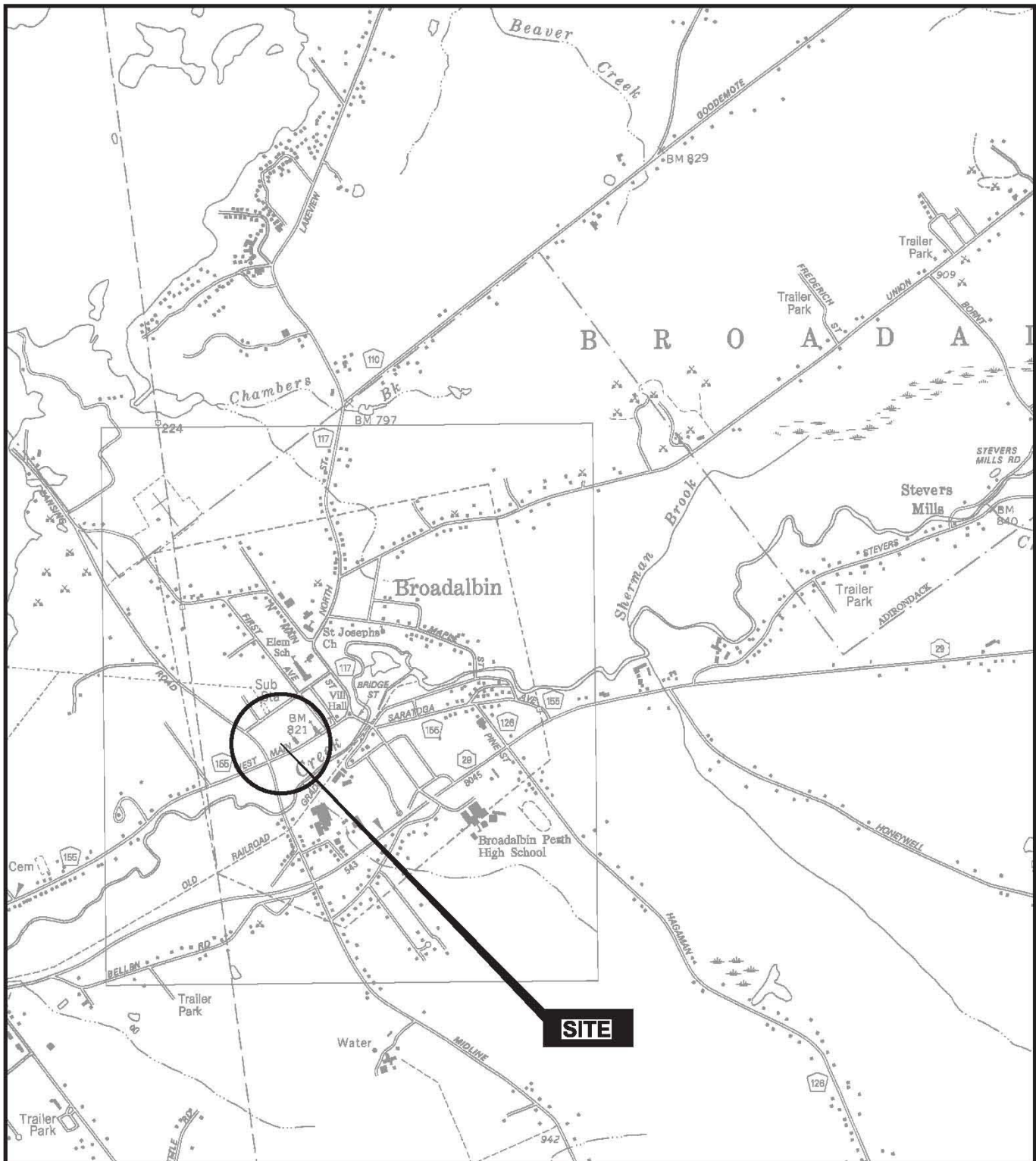
CDM, 1995b. *Final Feasibility Study (Detailed Analysis)*, August.

NYSDEC, 2004, *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 (June 2004 addendum).

NYSDEC, 1996, *Record of Decision*, March.

NYSDEC, 2010, *Technical Guidance for Site Investigation and Remediation.DER-10. Division of Environmental Remediation*, May.

Figures



MAP REFERENCE: NYS DOT 7.5 MIN. QUADRANGLE
 BROADALBIN SERIES

PLAN

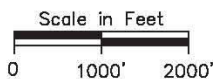
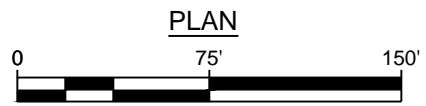
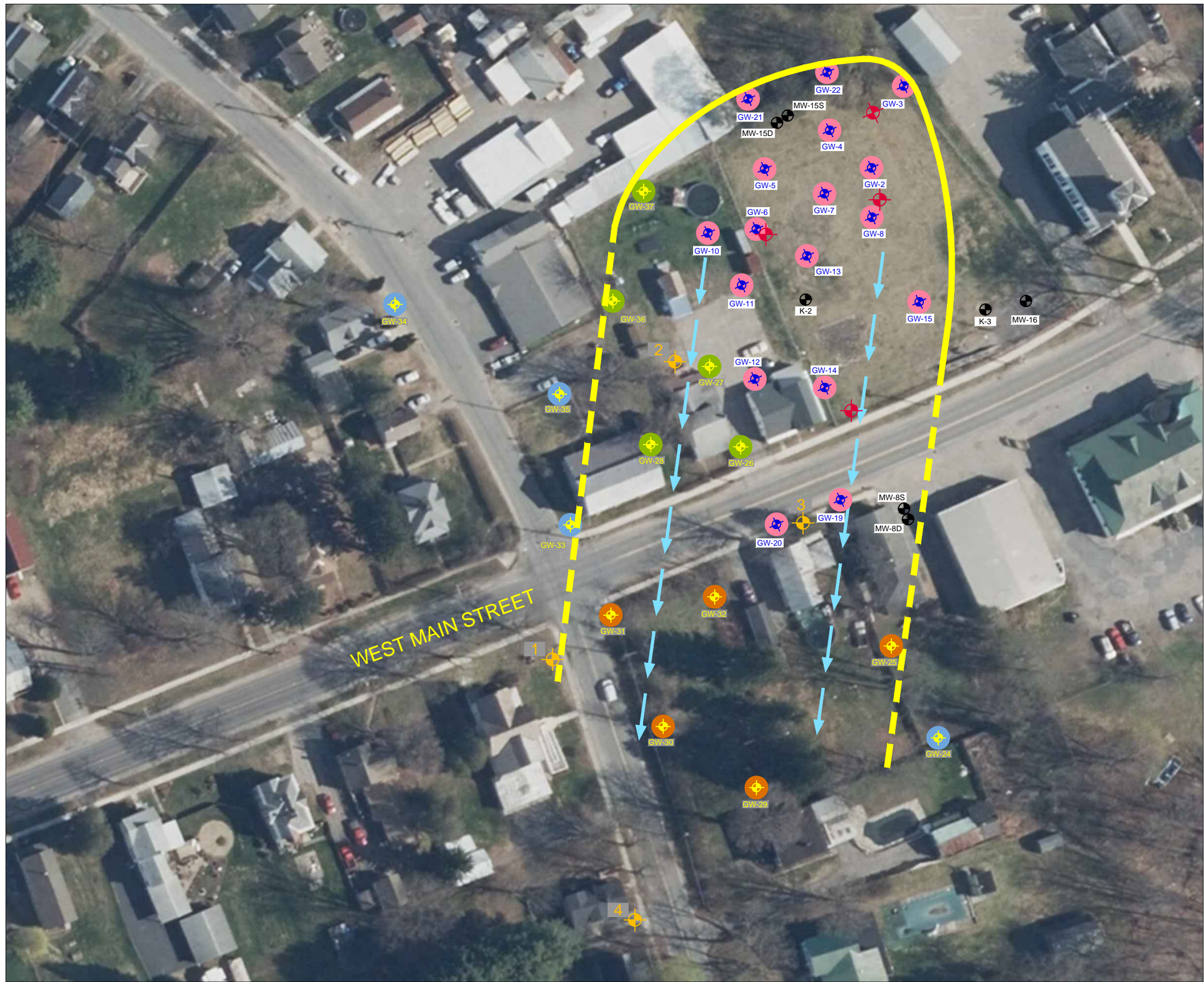


FIGURE 1
 SITE LOCATION PLAN
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK

DATE: OCTOBER 2013

PROJECT NO.: 60273289



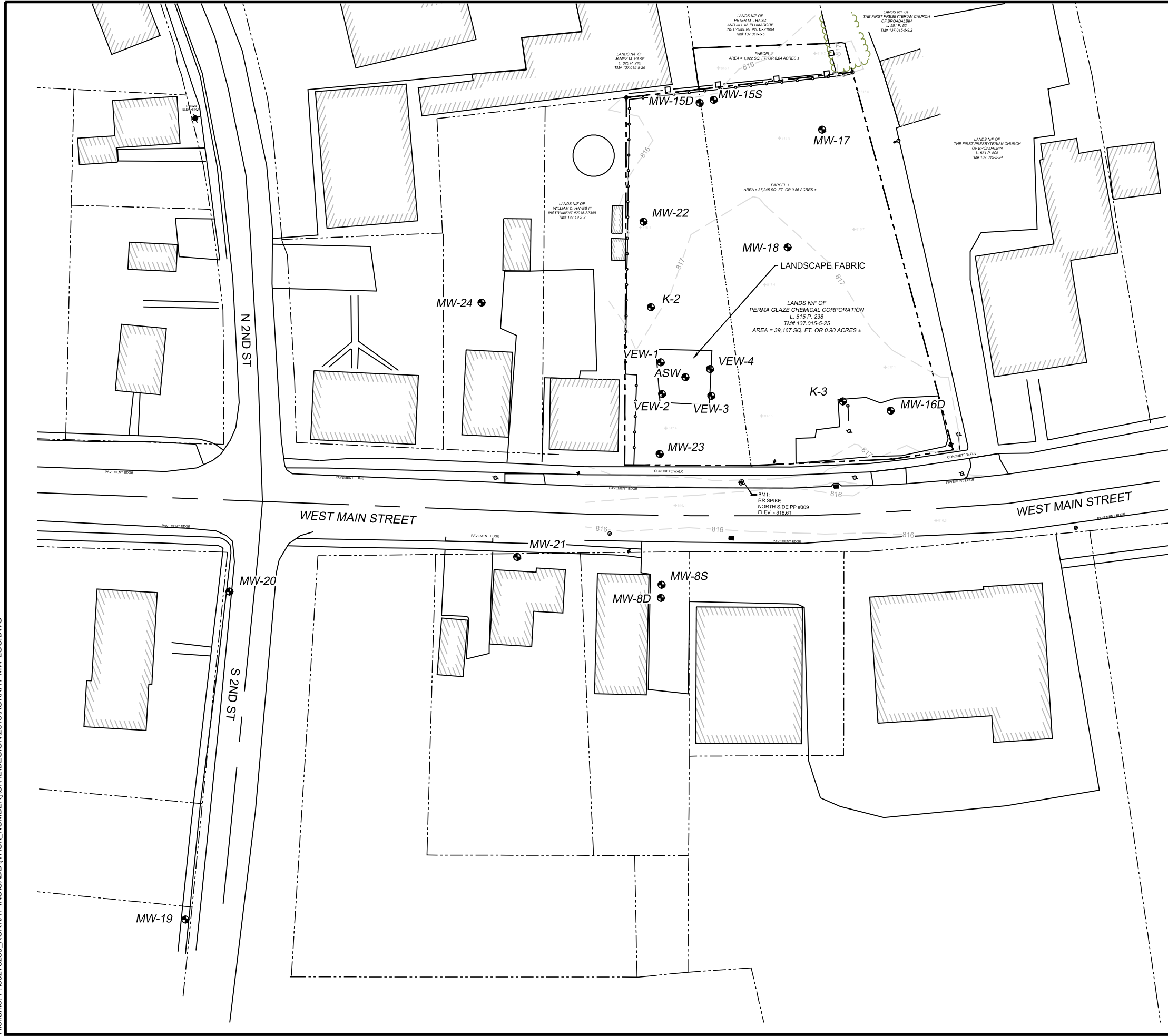
LEGEND

- APPROXIMATE LOCATION OF 2014 GROUNDWATER SAMPLE WITH RESULT GREATER THAN NYSAWQS
- EXISTING GROUNDWATER MONITORING WELL
- APPROXIMATE EXTENT OF PROJECTED AND INFERRED GROUNDWATER PLUME
- APPROXIMATE DIRECTION OF PROJECTED AND INFERRED GROUNDWATER FLOW PATH
- PROPOSED ON-SITE MONITORING WELL LOCATION
- PROPOSED OFF-SITE MONITORING WELL LOCATION
- OFF-SITE GROUNDWATER SAMPLE LOCATION (2015)

SAMPLE RESULT KEY

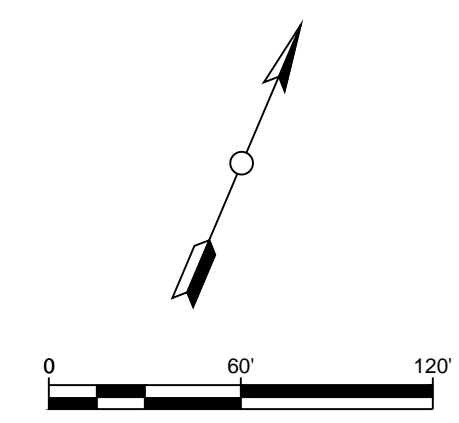
- SAMPLE RESULT EXCEEDS NYSAWQS STANDARDS FOR CVOC AND PETROLEUM VOCs (2015)
- SAMPLE RESULT EXCEEDS NYSAWQS STANDARDS FOR PETROLEUM VOCs (2015)
- SAMPLE RESULT BELOW NYSAWQS STANDARDS OR NON-DETECT (2015)

INFERRED GROUNDWATER PLUME LIMITS FROM 2014 AND 2015 INVESTIGATIONS



LEGEND

	SITE PROPERTY LINE
	PROPERTY LINE
	DEED DIVISION LINE
	CHAIN LINK FENCE LINE
	TOPOGRAPHY (1 FT.)
	CATCH BASIN
	UTILITY POLE
	LIGHT POLE
	SEWER MANHOLE
	WATER VALVE
	ELECTRIC METER
	GUY ANCHOR
	MW-18 ● MONITORING WELL



MAP REFERENCE:
 MAPPING BASED ON A PLAN TITLED TOPOGRAPHIC SURVEY OF
 NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 5-18-014
 70 WEST MAIN STREET, BROADALBIN, NEW YORK
 COUNTY OF FULTON, STATE OF NEW YORK BY, M J ENGINEERING,
 AND LAND SURVEYING, P.C., DATED SEPTEMBER 10 2015, LAST REVISED
 11/13/2015, INCLUDING ALL NOTES AND REFERENCES THEREIN.

Appendices

Appendix A
Environmental Notice

FULTON COUNTY CLERK

WILLIAM E. ESCHLER

Receipt

Receipt Date: 02/01/2013 11:38:20 AM
RECEIPT # 2013229249

Recording Clerk: FC
Cash Drawer: CASH1
Rec'd Frm: INDEPENDENT

Instr#: 2013-18049
DOC: MISC DOCUMENT
OR Party: NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION DEPARTMENT
EE Party: PERMA GLAZE CHEMICAL
CORPORATION

STANDARD	
Cover Page	\$5.00
Recording Fee	\$50.00
Cultural Ed	\$14.25
Records Management - County	\$1.00
Records Management - State	\$4.75

DOCUMENT TOTAL: ----> \$75.00

Receipt Summary	
TOTAL RECEIPT: ---->	\$75.00
TOTAL RECEIVED: ---->	\$75.00

CASH BACK: ---->	\$0.00
------------------	--------

PAYMENTS	
Check # 3612 ->	\$75.00

COPY

FILED
FULTON COUNTY
CLERK'S OFFICE

Korkay, Incorporated
Site No. 518014
70 West Main Street
Broadalbin, Fulton County, NY
Tax Map: 137.15-5-25

2013 FEB -1 AM 11:38
ENVIRONMENTAL NOTICE

RECEIVED

THIS ENVIRONMENTAL NOTICE is made the 25th day of January 20 13 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 70 West Main Street in the Village of Broadalbin, County of Fulton and State of New York, known and designated on the tax map of the County Clerk of the County of Fulton as tax map parcel number: Section 137.15 Block 5 Lot 25 which is part of lands conveyed by Kaldar, Inc. to the Perma Glaze Chemical Corporation by deed dated March 31, 1970 and recorded on October 4, 1971, in Book Liber 515 of Deeds at page 238 from the County of Fulton, the property being more particularly described in the metes and bounds and tax map 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 Operation and Maintenance ("O&M"), Plan 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).

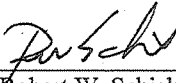
THIRD, no person shall disturb, remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls required for the Remedy, including but not limited to those engineering controls described in the O&M Plan and listed below, unless in each instance they first 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 the site.

FIFTH, 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 the site.

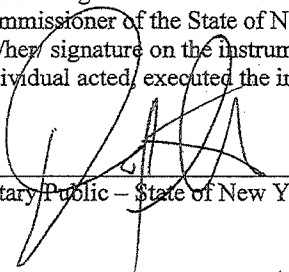
SIXTH, it is a violation of 6 NYCRR 375-1.11(b) to use the Property in a manner inconsistent with this environmental notice.

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

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

STATE OF NEW YORK) ss:
COUNTY OF ALBANY)

On the 2nd day of JANUARY, in the year 2013, before me, Robert. W. Schick, the undersigned, personally appeared, and is personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.


Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2014

Korkay, Incorporated
Site No. 518014
70 West Main Street
Broadalbin, Fulton County, NY
Tax Map: 137.15-5-25

Appendix A

METES and BOUNDS Description

ALL THAT TRACT, PIECE OR PARCEL OF LAND, situate, in the Town of Broadalbin, County of Fulton, and State of New York, bounded and described as follows:

PARCEL NO. 1.

Beginning at an iron post on Main Street, 640 feet westerly from the inside of the sidewalk on First Avenue, in the Village of Broadalbin, County of Fulton and State of New York; running thence north $11^{\circ}10'$ west, to an iron post, and continuing thence northerly to an iron post which is 222 feet more or less northerly from the iron post on Main Street heretofore mentioned; running thence in a westerly direction along the lands now or formerly belonging to the Estate of George W. Hughest, deceased; running thence in a southerly direction along the lands formerly owned by William Kennedy, now or formerly owned by Etta Perkins; and running thence in an easterly direction along Main Street in said Village to the first mentioned iron post and point and place of beginning.

PARCEL NO. 2.

COMMENCING at a point on the northerly side of West Main Street in said Village at a point approximately 640 feet westerly from the inside of the sidewalk on First Avenue in said Village; running thence Northeasterly, along the east line of lands now owned or supposed to be by Crossley Glove Co., Inc., a distance of approximately 250 feet to the south line of lands of E. C. and K. Tanner; running thence EASTERLY along the south line of land of said E. C. and K. Tanner a distance of approximately 90 feet to the west line of the lands now owned or supposed to be by the First Presbyterian Church of Broadalbin, New York; running thence SOUTHEASTERLY along the westerly line of lands of said First Presbyterian Church a distance of approximately 250 feet to the north line of West Main Street in said Village; running thence WESTERLY along the north line of West Main Street a distance of approximately 120 feet to the point and place of beginning, together with dwelling-house thereon.

All measurements in the above description being the same more or less.

Being the same premises conveyed to Kaldar, Inc. by Warranty Deed from M&W Glove Corp., formerly known as Crossley Glove Co., Inc. dated May 26, 1969, and recorded May 27, 1969, in the Fulton County Clerk's Office in Book 502 of Deeds at Page 1129.

Korkay, Incorporated
Site No. 518014
70 West Main Street
Broadalbin, Fulton County, NY
Tax Map: 137.15-5-25

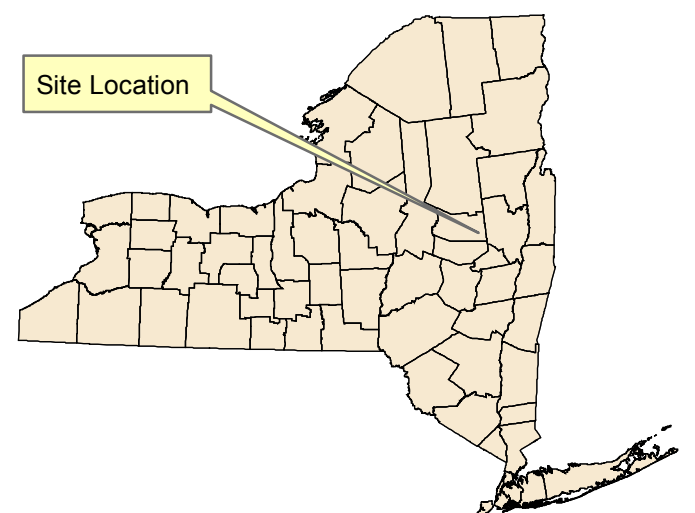
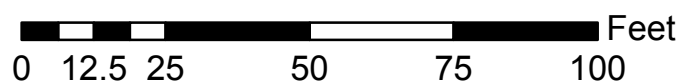
Appendix B



Korkay Site Location Environmental Notice

518014
70 West Main Street
Broadalbin, NY

Project Manager: Payson Long
Map Created By: Payson Long
Date Created: February 17, 2012





Parcel Search Buffer Parcels Clear Full View Print



View Layers View Legend

Update Map

- Base Map
- Label Visibility Layer
- Municipal Boundaries
- Tax Parcels
- Major Roads
- County Roads
- Roads
- 2001 Aerial Photos
- 2005 Color Aerial Photos
- 2005 Black and White Aerial Photos
- 2010 12inch Aerial Photos
- 2010 24inch Aerial Photos
- Topographic Maps
- Districts
- Natural Resources / Recreation

Zoom to Muni: Select a municipality...

Appendix B
List of Site Contacts

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
PERMA GLAZE CHEMICAL CORP.	No phone/No email
Scott A. Underhill	518-951-2208/ Scott.Underhill@aecom.com
John Santacroce, AECOM	518-951-2265/ John.Santacroce@aecom.com
Walter Howard, AECOM	518-951-2387/ Walter.Howard@aecom.com
Payson Long	(518) 402-9813/ payson.long@dec.ny.gov
Rich Wagner, Region 5 Engineer	(518) 897-1241
Russ Huyck, Region 5 Spills Engineer	(518) 897-1241
First Presbyterian Church (Adjacent to site)	518-883-8086/ lmartin27@gmail.com
Mr. William Hayes (Adjacent to site)	518-883-4115
Mr. James Hare (Adjacent to site)	518-883-3012
NYS DOH Charlotte Bethoney Interim Region Chief	518-402-7880/ cmb18@health.state.ny.us
NYS DOH Wendy S. Kuehner Public Health Specialist II	(518) 402-7880/ wsk01@health.state.ny.us

Appendix C
March 2014
Periodic Review Report

FINAL PERIODIC REVIEW REPORT

**Korkay, Inc.
Site No. 5-18-014**

Prepared for:

**SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
625 Broadway
Albany, New York 12233**

Prepared by:



40 British American Boulevard
Latham, New York 12110

March 2014

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1.0 EXECUTIVE SUMMARY

This Periodic Review Report (PRR) has been prepared for the Korkay, Incorporated (Site 518014) at the request of the New York State Department of Conservation (NYSDEC). The reporting period covered in this report is January 15, 2007 through September 16, 2013. This PRR was prepared by AECOM under Work Assignment number D007626-20.

Korkay, Incorporated (Korkay) was a supplier of detergents, solvents, and degreasers to the automotive industry. Korkay purchased bulk quantities of chemicals that were stored on-site for repackaging and/or blending into commercial products including automobile wax, and hand cleaners. In addition, Korkay also operated as a drum reclamation facility. Drums were accepted containing a variety of chemicals for which limited documentation exists. The chemicals were received as residuals in drums being reclaimed making their quantity difficult to determine. The drum reclamation process was conducted without appropriate containment, with residual chemicals and chemical laden rinsate being discharged through the facilities septic system or directly to the ground surface.

A Record of Decision (ROD) was entered by the NYSDEC in March 1996 which documents the Site cleanup objectives and indicates the remedial activities to be conducted.

In August of 1997 a remedial action was conducted at the Site which included demolition of a building, and excavation and disposal of grossly contaminated soils. In November 1998, a soil vapor extraction/air sparging (SVE/AS) system was constructed and put into operation to address the residual soil contamination. The system was operated intermittently until 2003.

Post remediation groundwater sampling results indicated that groundwater in the former source area remained contaminated in excess of applicable standards. A remedial system optimization (RSO) study performed in 2007 determined that although the remediation efforts were effective at reducing Site contamination, subsurface soil and groundwater impacts still existed. A subsequent focused feasibility study (FS) resulted in the recommendation of further soil excavation and off-site disposal along with continued groundwater monitoring and imposition of a deed restriction.

The RSO study determined that although the remediation efforts were effective at reducing Site contamination, subsurface and groundwater impacts still existed. A focused FS resulted in the recommendation of further excavation and off-site disposal along with continued groundwater monitoring and imposition of a deed restriction. The RSO contained a focused feasibility study which recommended the removal of the soil within a 60 ft by 60 ft source area near the former SVE/AS. The alternative included reuse of excavated soil from the ground surface to 6 ft bgs and the offsite disposal of soil excavated from 6 ft bgs to the top of clay at an average depth of 15 ft bgs. Excavation would require dewatering. Removal and treatment of groundwater from the source area would effectively remove the future contaminant load resulting in improved groundwater conditions at the Site and downgradient.

In 2010 88-soil borings were installed at the site to further characterize and delineate soil impacts in preparation for the soil removal activities. The field data and laboratory data collected as part of this investigation indicates widespread subsurface soil impacts at the Site, in comparison to the FS. Approximately 35,000 square feet of the Site may be impacted above SCGs. Using the same excavation approach as the FS with the newly collected data, approximately 7,600 cubic yards of soil from ground surface to 6 feet would be excavated and used as fill and 11,500 cubic yards of soil would need to be shipped offsite for disposal.

An Environmental Notice (EN) for the Site was filed with Fulton County on January 25, 2013.

OM&M PLAN COMPLIANCE

Site inspections were documented in Inactive Hazardous Waste Site Operations and Maintenance Review Reports completed by NYSDEC inspectors. Site groundwater is monitored on a rotating 5 quarter basis with sampling events conducted on a network of wells installed on, and adjacent to the Site. The most recent groundwater samples were collected on June 25, 2013. A draft report with the results of this sample event was submitted to the NYSDEC in October 2013. A Site Management Plan including a revised OM&M plan is being prepared for the Site.

EFFECTIVENESS OF REMEDIATION

In general dissolved VOC concentrations continue to display a decreasing trend both in area. Results from the 2007 sampling indicated that seven wells had TVOC concentrations above 100 µg/L, whereas during the 201 sampling event only two wells had TVOC concentrations above 100 µg/L, including ASW and VEW-1. Former source area well ASW continues to contain TVOCs above 1,000 µg/L, however, when compared to the 2008 result of more than 5,000 µg/L, this is a significant reduction. Similarly, the 2012 TVOC concentration in VEW-1 of 327.76 µg/L is approximately 78 percent less than the 2008 TVOC concentration of 1,542.50.

In 2010 88-soil borings were installed at the site to further characterize and delineate soil impacts in preparation for the soil removal activities. The results indicate that approximately 35,000 square feet of the Site may be impacted. An estimated 11,500 cubic yards of soil are impacted at the Site.

IC/EC COMPLIANCE AND REQUIREMENTS

Currently, certification that the Site IC/ECs are in compliance with the requirements stated above can be completed, however, the following deficiencies should be addressed:

The downgradient well pair MW-8S and MW-8D, flushmount wells, are located in an area that is occasionally covered by ponding water. Surface water infiltrating into the monitoring well network will affect the groundwater chemistry, and cause non-representative sample results.

The fence at the site should be inspected frequently during the winter. There is evidence that the neighboring property pushes snow from their driveway into the fence. This may cause the fence to break loose from the posts.

Residual contamination above SCGs remains in soil, at depths between 8 and 12 feet below ground surface (bgs), and the shallow groundwater aquifer at the site. Currently the remedial strategy for the site is monitored natural attenuation, which is not likely to achieve site closure in a timely manner consistent with expected protection of the environment and plume reduction.

RECOMMENDATIONS

AECOM recommends the following:

- Because the Site is at the center of a community an annual PRR is recommended in order to determine the compliance of the facility with the EC/IC's in place;
- Maintenance of signs indicating restricted access and indicating that environmental contaminants are present;
- Removal of the mobile treatment unit present at the Site to a storage facility;
- Continued groundwater sampling to monitoring the effectiveness of the former SVE system;
- Repairing of monitoring wells MW-8S and MW-8D is recommended to prevent surface water infiltration;
- Expansion of the monitoring well network onsite and off-site to further delineate the dissolved phase plume; and
- Development of an official Site Management Plan based on current DER-10 guidance is suggested in order to assure that appropriate and comprehensive site management is completed throughout the remaining post remediation monitoring period.

2.0 SITE OVERVIEW

Korkay, Incorporated (Korkay) located in Broadalbin, NY, was a supplier of detergents, solvents, and degreasers to the automotive industry from 1969 to 1980 (**Figure 1**). Korkay purchased bulk quantities of chemicals that were stored onsite for repackaging and/or blending into commercial products including automobile wax and hand cleaners. In addition to the production of commercial products, Korkay also operated as a drum reclamation facility. Drums were accepted containing an unknown variety and quantity of chemicals. The drums were emptied of any remaining chemicals, and were washed, rinsed and relined. This process was conducted without appropriate containment, such that the chemicals and chemical-laden rinsate were discharged through the facility's septic system, or directly to the ground surface. The NYSDEC and NYSDOH inspected the Site in 1979 and documented the occurrence of these activities. In 1980, Korkay installed a 4,000 gallon above ground storage tank (AST) to appropriately contain the residual chemicals and rinsate generated from drum reclamation. Reports and Site documentation indicate that the drums contained acetone, isopropyl alcohol, degreasers and perfumes, as well as other chemicals.

The NYSDEC conducted a Site inspection in 1992, at which time numerous drums of hazardous waste were found and secured for removal. Between 1993 and 1995, Camp, Dresser, and McKee (CDM) conducted a Remedial Investigation (RI) and Feasibility Study (FS) of the Site. The first phase of the RI, conducted from September 1993 until April 1994, included the collection of surface and subsurface soil samples and the installation and sampling of monitoring wells. The second phase of the RI, conducted between October 1994 and May 1995, included the collection of additional soil samples to delineate vertical extent of contamination and background levels and the collection of a second round of groundwater samples.

Evaluations of remedial alternatives were presented in a Final Phase I & II FS (February 1995) and a detailed analysis FS (August 1995). Following submission of the FS, a Record of Decision (ROD) was issued in March 1996.

As outlined in the ROD, the overall remediation goals of the Site are:

- 1) To eliminate, to the greatest extent possible, on-site soils as a source of groundwater contamination; and
- 2) To eliminate or reduce human exposure to on-site soils contamination.

To accomplish these goals based upon the results of the RI/FS and the evaluation of alternatives, the NYSDEC selected: excavation and off-site disposal of the top six inches of contaminated surface soil; backfill excavated areas with clean soil and cover soil with vegetation; installation and operation of a SVE system with optional AS system or Site dewatering; and Site environmental monitoring for five years.

The specific elements of the remedy were:

- A remedial design program to verify the components of the conceptual design, provide the details necessary for the construction, operation and maintenance, and monitoring (OM&M) of the remedial program and resolve uncertainties identified during the RI/FS;
- Excavation and off-site disposal of approximately 145 cubic yards of contaminated surface soil;

- Backfilling excavated areas with clean fill that will be compacted, graded and covered with vegetation to reduce infiltration of precipitation and reduce erosion;
- Conduct SVE (with optional AS or Site dewatering) for a period of up to six months. The SVE system was to be installed in the area with the highest contamination level;
- Impose deed restrictions to exclude the use of Site groundwater for residential or industrial use;
- Demolition and disposal of the on-site building; and
- Annually monitor, for a period of five years, the groundwater from two wells for VOCs, SVOCs, and pesticides. The Site was to be reevaluated at the end of the five year period to assess the effectiveness of the remedy.

Building demolition and excavation and off-site disposal of contaminated soils occurred between April and August 1997. Operation of the SVE system began in November 1998. In July 2000, the contract with CDM expired and the NYSDEC assumed responsibility for Site operations. The NYSDEC discontinued operation of the SVE system in 2003.

Post remediation groundwater sampling results indicated that groundwater in the former source area remained contaminated in excess of applicable standards. A remedial system optimization (RSO) study was initiated in 2007 in order to determine the most effective mechanism to address the groundwater contamination.

The RSO study determined that although the remediation efforts were effective at reducing Site contamination, subsurface soil and groundwater impacts still existed. A focused FS resulted in the recommendation of further soil excavation and off-site disposal along with continued groundwater monitoring and imposition of a deed restriction.

In 2010 88-soil borings were installed at the site to further characterize and delineate soil impacts in preparation for the soil removal activities. The field data and laboratory data collected as part of this investigation indicates widespread subsurface soil impacts at the Site, in comparison to the FS. Approximately 35,000 square feet of the Site may be impacted above SCGs. Using the same excavation approach as the FS with the newly collected data, approximately 7,600 cubic yards of soil from ground surface to 6 feet would be excavated and used as fill and 11,500 cubic yards of soil would need to be shipped offsite for disposal.

An Environmental Notice (EN) for the Site was filed with Fulton County on January 25, 2013.

3.0 EVALUATE REMEDY PERFORMANCE, EFFECTIVENESS AND PROTECTIVENESS

This section presents a summary of the effectiveness and protectiveness of the current ECs and ICs in place at the site.

3.1 MONITORING WELL NETWORK DESCRIPTION

The monitoring well network consists of four vapor extraction wells (VEWs) and one AS well, all nonfunctioning and located in the former source area, as well as four shallow aquifer monitoring wells and three deep aquifer monitoring wells. All wells are constructed of 2-inch diameter polyvinylchloride (PVC). All VEWs are installed to a depth of approximately 9-ft below ground surface. The screened interval is 5-ft in length, installed approximately 1-ft into the groundwater. The wells are sampled on a 5 quarter basis. The monitoring well network is presented on **Figure 2**.

3.2 OPERATION, MAINTENANCE AND MONITORING PLAN COMPLIANCE REPORT

During this reporting period there was no active remediation at the Site O&M activities. Activities currently required are limited to inspections, and groundwater monitoring. Inspections are performed concurrently with the groundwater sampling events and are documented in the groundwater sampling reports. Site groundwater is monitored through sampling events conducted every fifth quarter on a network of wells installed on, and adjacent to the Site, as described in Section 3.1.

3.3 MONITORING PLAN COMPLIANCE REPORT

3.3.1 Confirm Compliance with Monitoring Plan

Five groundwater sampling events were conducted during this reporting period. Groundwater samples were collected from 12 wells in August 2007, November 2008, March 2010, January 2012, and June 2013. All of the samples were analyzed for VOCs; the 2012 samples were analyzed for SVOCs, and pesticides, and the 2013 samples were analyzed for pesticides as well.

3.3.2 Confirm that Performance Standards are Being Met

3.3.2.1 Soil Remedial Performance

A Remedial System Optimization Report (RSO) prepared by AECOM in August 2009 evaluated historical remedial actions including the SVE/AS system which had operated at the Site from 1998 through 2003. In August 2007 soil borings were installed within the SVE/AS treatment area to collect soil data in support of the RSO. The RSO determined that the SVE/AS was effective in reducing VOC concentrations in the vadose zone soils closest to the VEWs, but that “dead zones” exist in the areas between the VEWs; VOC concentrations had not been significantly reduced in the saturated soils. A focused feasibility study was prepared as part of the RSO for additional remedial measures to address remaining subsurface impacts. The recommended alternative was for the excavation and off-site disposal of soil exceeding the Standards Criteria and Guidance (SCGs) of Unrestricted Use Soil Cleanup Objectives from 6 NYCRR Subpart 375-6 (December 14, 2006). Based on the data available during the preparation of the RSO, the area of impacted soil was assumed 60-feet (ft) by 60-ft; the actual

extent of contaminated soil had not been delineated as part of the August 2007 sampling event. The RSO estimated 1,200 tons of soil would be excavated and sent off site for disposal. This alternative included the reuse of the top 6-ft of soil, and excavation to the top of the clay layer approximately 12-ft below ground surface (bgs). The proposed remedy included the use of a temporary groundwater treatment system for dewatering the excavation.

At the request of the NYSDEC 88 soil borings were installed in March 2010 to delineate the 60-ft by 60-ft excavation area proposed in the RSO. However, the borings completed on the edge of that area appeared to be impacted and the NYSDEC asked AECOM to complete additional borings to further delineate the nature and extent of soil impacts beyond the 60-ft by 60-ft area. A total of 28 soil borings were installed (ASB-1 through ASB-28 as presented on **Figure 3**). Samples were collected for laboratory analysis at select locations to characterize the nature of the impacts and delineate the vertical and horizontal extent of on-site impacted soil. A majority of the samples around the former AS/SVE area were collected from the underlying clay aquitard to delineate the vertical extent of the impacted soil. The samples were sent under chain of custody to Mitkem Laboratories for analysis of Volatile Organic Compounds (VOCs) by EPA Method 8260, Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270, and Pesticides by EPA Method 8081. A total of 32 samples were collected for analysis including two duplicate samples.

The field data and laboratory data collected as part of this investigation indicates widespread subsurface soil impacts at the Site. As presented in **Table 1**, staining and/or odors were noted in 21 of the 26 borings. In general the soil which exhibited odors and/or staining had PID readings greater than 100 parts per million (ppm) and the soils exhibiting no evidence of impacts had PID readings of less than 10 ppm. The approximate areal extent of subsurface soil impacted with VOCs and/or pesticides above SCGs is shown on **Figure 4**. Approximately 35,000 square feet of the Site may be impacted above SCGs. For the purpose of this report, PID readings above 100 ppm and the presence of staining were assumed to be indicators that the soil would not meet SCGs.

Figures 5 and 6 are cross sections trending north to south and east to west. The cross sections present site geology as interpreted from soil borings, VOC and pesticide results, headspace readings and a visual representation of the staining and odors. The top 5-ft of soil is relatively un-impacted with potential several source areas (e.g., the area around ASB-25 and ASB-3). Staining and/or odors were noted in the top foot of these borings. In the borings completed to the top of the clay the staining and odors were noted throughout a smear zone through the saturated soil to the top of the clay. Several samples were collected from the top of the clay and a majority of those samples did not have detections above SCGs.

Using the same approach with the newly collected data, approximately 7,600 cubic yards of soil from ground surface to 6 feet would be excavated and used as fill and 11,500 cubic yards of soil would need to be shipped offsite for disposal.

3.3.2.2 Groundwater Remedial Performance

In the 12 monitoring wells sampled, the total VOC (TVOC) concentrations ranged from below detection limits (ND) to 3,383.00 µg/L. No VOCs were detected above method detection limits in the samples collected from Flushmount, MW-15D, MW-8D and MW-8S. The Flushmount well, MW-8D and MW-15D represent the three deep wells on-site (depth greater than 40 feet). No

VOCs were detected above standards or guidance values in the samples from K-2, K-3, MW-15S and VEW-2. Four wells, ASW, VEW-1, VEW-3 and VEW-4 had compounds detected above AWQS. The maximum concentration of TVOCs was observed in the sample collected from well ASW, located in the former source area. SVOC analysis was not performed during this sampling period. **Figure 7D** is an isoconcentration map of TVOC concentrations reported for the shallow wells (less than 15 feet deep) from the June 2013 sampling event. Provided for comparison are **Figures 7, 7A, 7B, and 7C**, which display TVOC isoconcentrations from the August 2007, November 2008, March 2010, and January 2012 sampling events, respectively.

Results from the three deep wells, Flushmount, MW-8D and MW-15D, were all non-detect during the June 2013 sampling event. No compounds have been detected above AWQS in these wells during any of the sampling events as presented on **Table 2**, demonstrating that groundwater contamination is limited to the shallow aquifer.

As during the previous sampling event, no compounds were detected above method detection limits in the sample from MW-8S during the June 2013 sampling event. This well is located off-site, down-gradient from the former source area.

While wells K-2, K-3, MW-15S and VEW-2 were reported to contain concentrations of individual VOCs above method detection limits, their values were all below AWQS. Well K-2 and well K-3 are reported to contain total xylenes at an estimated concentration of 5.0 µg/L and 4.0 µg/L, respectively, and no other compounds were detected above method detection limits. Well MW-15S is reported to contain two compounds above method detection limits, including methylcyclohexane and toluene. Only one compound, trichloroethene, was detected in the sample from VEW-2, at an estimated concentration of 3.0 µg/L.

Two wells, VEW-3 and VEW-4, contained VOC compounds detected slightly above AWQS. TVOC in well VEW-3 increased considerably since the January 2012 sampling, but remained much lower than the concentrations reported during the August 2007 and November 2008 sampling events. Well VEW-4 showed a decreasing trend in TVOC during the most recent sampling, but showed an increase in 1, 2, 4-Trimethylbenzene as well as 1, 3, 5-Trimethylbenzene.

The highest concentrations of VOCs, significantly above AWQS, were found in the former source area wells VEW-1 and ASW. ASW, the former air sparging well, showed the highest concentration of TVOCs during the June 2013 sampling event, at 3,383 µg/L. VEW-1, located northwest of ASW, contained 515 µg/L TVOCs. The TVOC concentrations from both wells have increased since the January 2010 sampling event, with TVOC in ASW reaching the highest limits since the November 2008 sampling event.

Chart 1 presents source area wells (ASW, VEW-1, VEW-2, VEW-3 and VEW-4) groundwater TVOC concentration trends. Since the August 2007 sampling event, each of these wells indicates a decreasing trend in TVOC concentrations, with exception to ASW, which indicated higher levels than results for August 2007. **Chart 2** presents groundwater TVOC concentration trends for plume boundary wells (MW-8S, MW-15S, K-2 and K-3). Each of these wells also show a decreasing trend in TVOC concentration over time, with exception to K-3, which has increased slightly since non-detect readings in August 2007.

3.4 REMEDIATION GOALS AND SITE-CLOSURE CRITERIA

The overall remedial goals as specified in the March 1996 ROD are:

- 1) To eliminate, to the greatest extent possible, on-site soils as a source of groundwater contamination; and
- 2) To eliminate or reduce human exposure to on-site soils contamination.

The COCs for site soils as identified in the ROD. The SCGs for soils presented in the ROD were taken from NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046 dated January 24, 1994. In December 2006, the NYSDEC promulgated 6 NYCRR Part 375 that established new SCGs for sites administered under the State Superfund Program. The Part 375 regulations contain varying levels of cleanup criteria, the most conservative are for Unrestricted Use. The Unrestricted Use, which provides for protection of groundwater, human health and the environment, are considered appropriate for the soils.

The long-term goal for groundwater is to reduce concentrations “to the extent practical based on technological limitations” to levels below SCGs. Groundwater COCs as identified in the ROD are presented in Table 2 along with previous and current SCGs. The SCGs for groundwater presented in the ROD were taken from the NYSDEC Technical and Operational Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values dated October 22, 1993. The Ambient Water Quality Standards updated in June 1998 are considered to be the appropriate SCG for the groundwater at the Korkay Site for the PRR.

3.5 IC / EC CERTIFICATION PLAN REPORT

Institutional and Engineering controls at the Site currently consist of an Environmental Notice (EN) on file with Fulton County and fencing at the property boundaries. The EN restricts property and groundwater use at the Site. The EN was filed in January 2013 and a copy is attached as **Appendix A**.

3.5.1 IC / EC Requirements and Compliance

Determination of compliance with the Institutional and Engineering controls at the site is made based on the following criteria:

- The IC/ EC(s) applied at the site are in place as documented in this report,
- Nothing has occurred that would impair the ability of such controls to protect the public health and the environment, or constitute a violation or failure to comply with any element of the SMP for such controls,
- Access to the site will continue to be provided to the Department, to evaluate the remedy including access to evaluate the continued maintenance of such controls.

Currently certification that the site IC/ECs are in compliance with the requirements stated above can be completed, however, the following deficiencies should be addressed:

The downgradient well pair MW-8S, and MW-8D flushmount wells, are located in an area that is occasionally covered by ponding water. Surface water infiltrating into the monitoring well network will affect the groundwater chemistry, and cause non-representative sample results.

The groundwater monitoring and soil sampling conducted during this reporting period indicates that there is residual contamination above SCGs in soil, at depths between 8 and 12 feet bgs,

and the shallow groundwater aquifer at the Site. Currently the remedial strategy for the site is monitored natural attenuation, which is not likely to achieve site closure in a timely manner consistent with expected protection of the environment and plume reduction.

3.5.2 IC/EC Certification Forms

Refer to Appendix B.

4.0 EVALUATION OF COSTS AND OBSERVATIONS

4.1 SUMMARY OF COSTS

Total annual costs for continuation of the required monitoring associated with the current remedial strategy, monitored natural attenuation, is approximately \$12,000 based on costs incurred in calendar year 2013. Major cost components are allocated through the 5 year PRR period are as follows:

- Long-term monitoring (every 5 quarters).... \$13,000
- PRR Reporting \$5,500
- Site O&M.....\$2,000

Site costs could be greatly increased should the NYSDEC decide to for-go additional remediation at the Site.

4.2 OBSERVATIONS

The downgradient well pair MW-8S, and MW-8D flushmount wells, are located in an area that is occasionally covered by ponding water. Surface water infiltrating into the monitoring well network will affect the groundwater chemistry, and cause non-representative sample results.

- This is indicative of a moderate problem based on the fact that ponding water infiltration is an intermittent issue, and may not contribute significant alteration to groundwater chemistry.

The Site fence may be under stress from neighboring properties particularly from snow piles. The fence should be monitored during the winter to ensure it is not compromised.

- This is indicative of a slight problem based on the fact that the site is secured with a chain link fence.

Residual contamination above SCGs remains in soil, at depths between 8 and 12 feet bgs, and the shallow groundwater aquifer at the site and offsite downgradient. Currently the remedial strategy for the site is monitored natural attenuation, which is not likely to achieve site closure in a timely manner consistent with expected protection of the environment and plume reduction. The 2010 soil sampling indicates that there is a significant mass of (VOC and Pesticide) contamination in the subsurface soil across a majority of the Site.

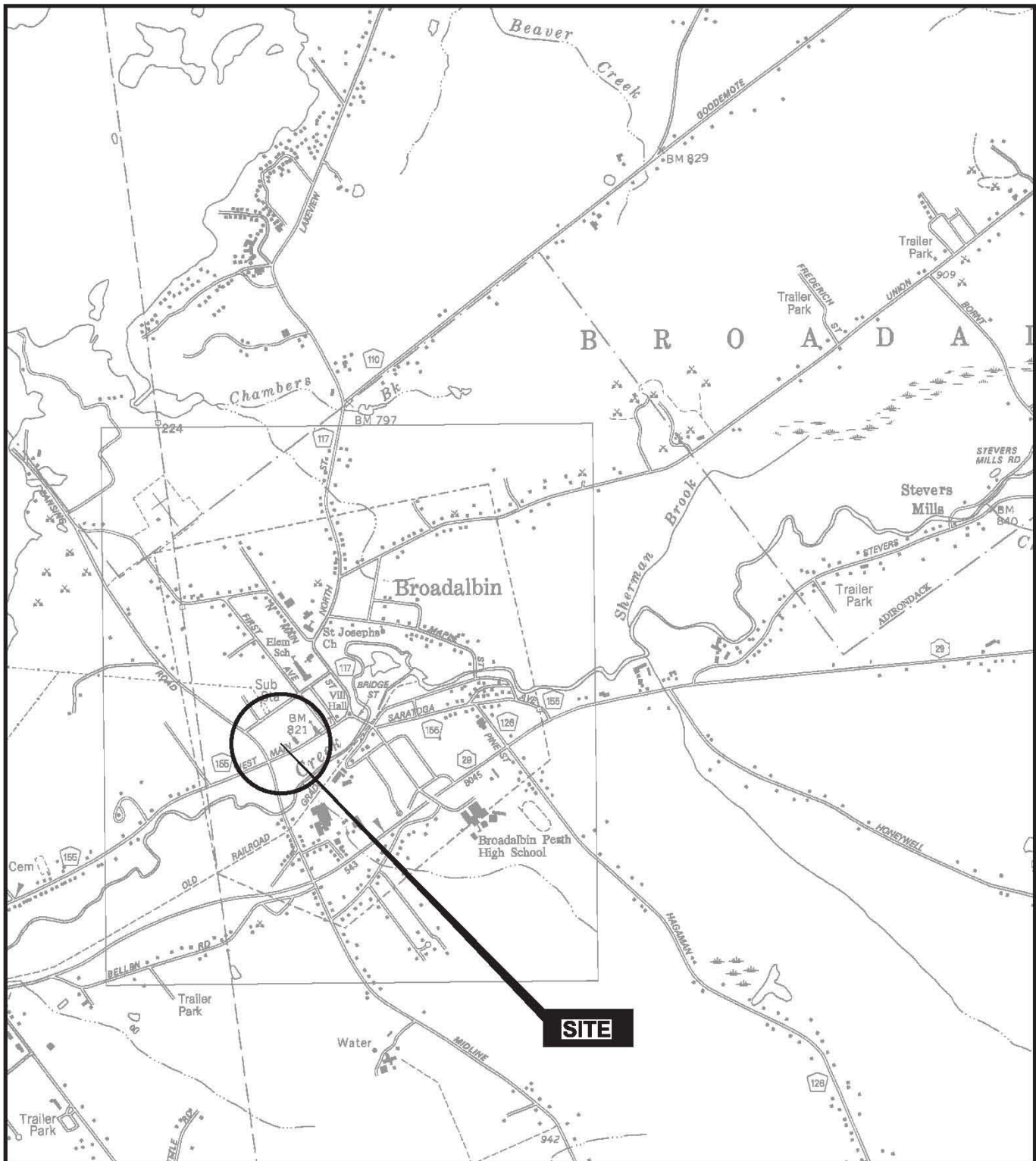
- This is indicative of a moderate problem as the SCGs will not be achieved according to the intent of the ROD.

5.0 RECOMMENDATIONS AND CONCLUSIONS

AECOM recommends the following:

- Because the Site is at the center of a community an annual PRR is recommended in order to determine the compliance of the facility with the EC/IC's in place;
- Maintenance of signs indicating restricted access and indicating that environmental contaminants are present;
- Removal of the mobile treatment unit present at the Site to a storage facility;
- Continued groundwater sampling to monitoring the effectiveness of the former SVE system;
- Repairing of monitoring wells MW-8S and MW-8D is recommended to prevent surface water infiltration;
- Expansion of the monitoring well network onsite and off-site to further delineate the dissolved phase plume; and
- Development of an official Site Management Plan based on current DER-10 guidance is suggested in order to assure that appropriate and comprehensive site management is completed throughout the remaining post remediation monitoring period.

FIGURES



MAP REFERENCE: NYS DOT 7.5 MIN. QUADRANGLE
BROADALBIN SERIES

PLAN

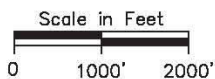
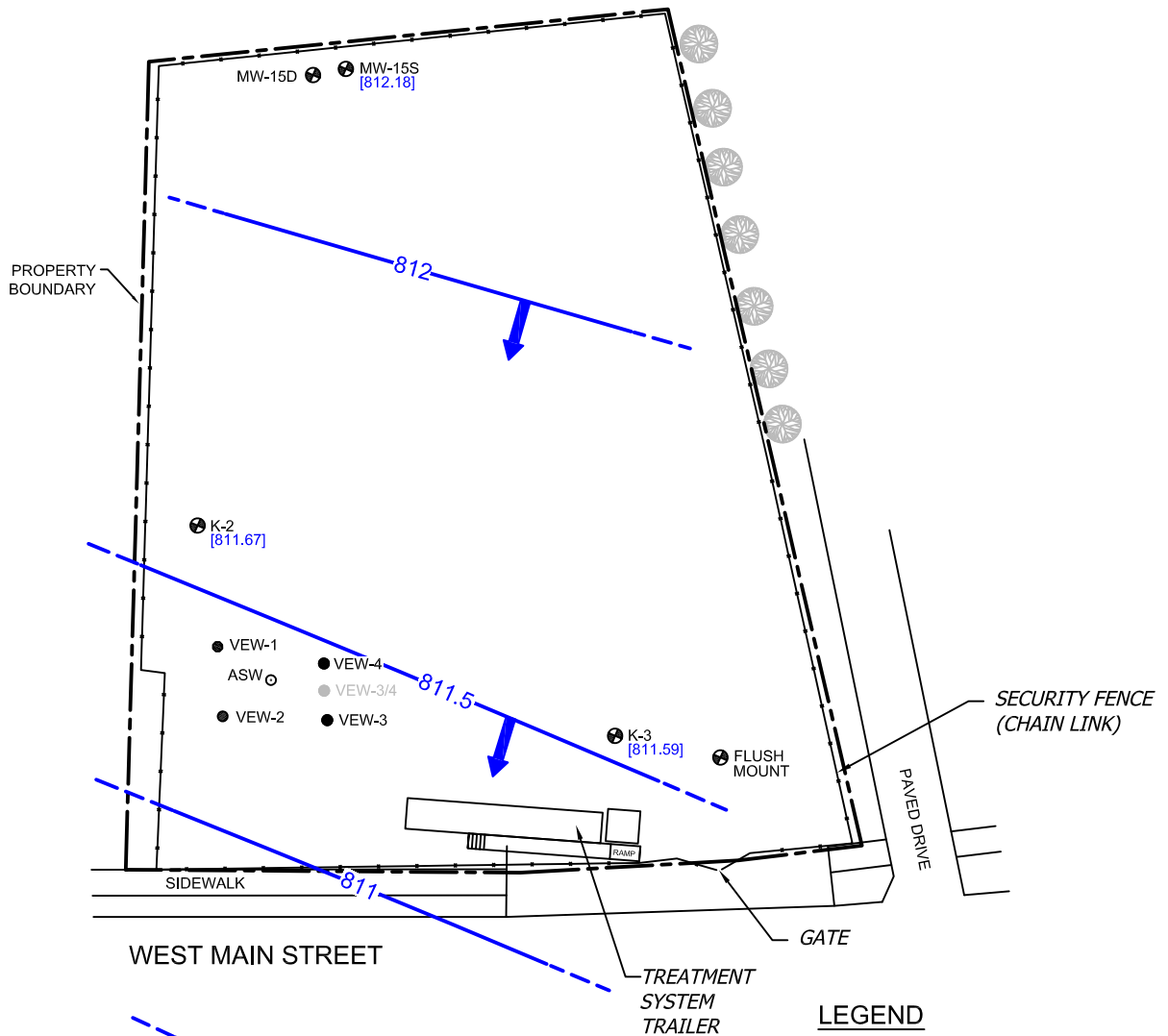


FIGURE 1
SITE LOCATION PLAN
NYSDEC SITE ID: 5-18-014
KORKAY INC.
70 WEST MAIN STREET
BROADALBIN, NEW YORK

DATE: OCTOBER 2013

PROJECT NO.: 60273289

MW 4-S (OUT OF SERVICE)
 MW 4-D



LEGEND

- K-2 [810.55] MONITORING WELL LOCATION (WATER TABLE ELEVATION)
- VEW-1 SOIL VAPOR EXTRACTION WELL
- ASW AIR SPARGE WELL
- 809.5 GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION
- SITE BOUNDARY (APPROXIMATE)

NOTE: FOR MAP REFERENCE INFORMATION, SEE FIGURE 1-2 "SITE LAYOUT".

PLAN



Scale in Feet

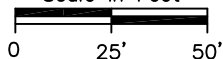
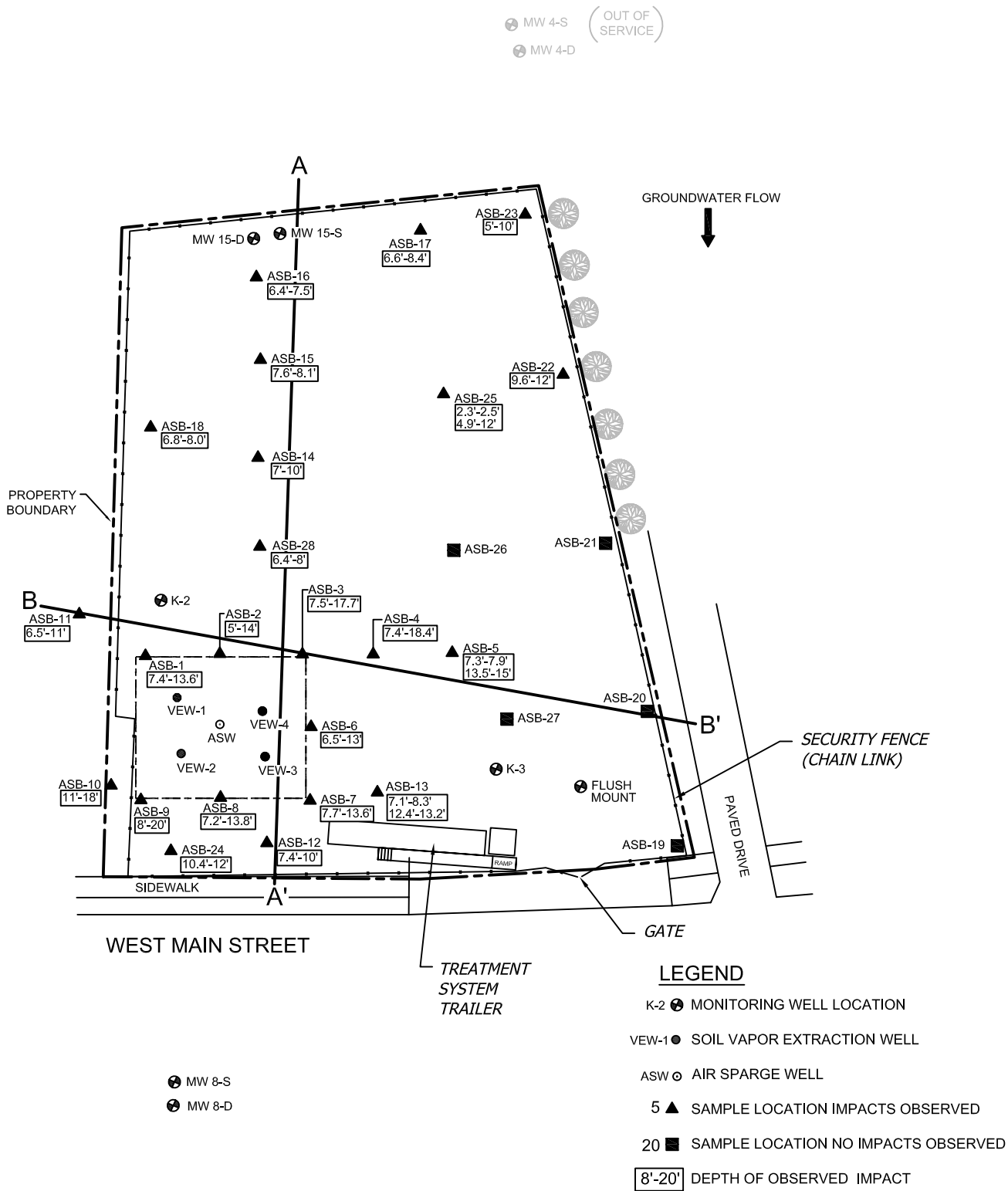


FIGURE 2
 SHALLOW AQUIFER WATER TABLE CONTOUR MAP
 JUNE 25, 2013

NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK

DATE: OCTOBER 2013

PROJECT NO.: 60273289



PLAN

GENERAL MAPPING REFERENCE, MAPPING SHOWN COMPILED FROM THE FOLLOWING :

1. PLAN TITLED "EXISTING SITE PLAN" FIGURE 1-2.
2. PLAN TITLED "TREATMENT SYSTEM LAYOUT AND PRE-STARTUP SOIL BORING LOCATIONS" SITE LAYOUT, FIGURE 4-1, BY CAMP DRESSER & MCKEE.
3. SUB-METER GPS SURVEY PERFORMED BY EARTH TECH, NOVEMBER 2007.

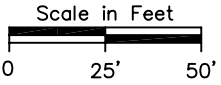
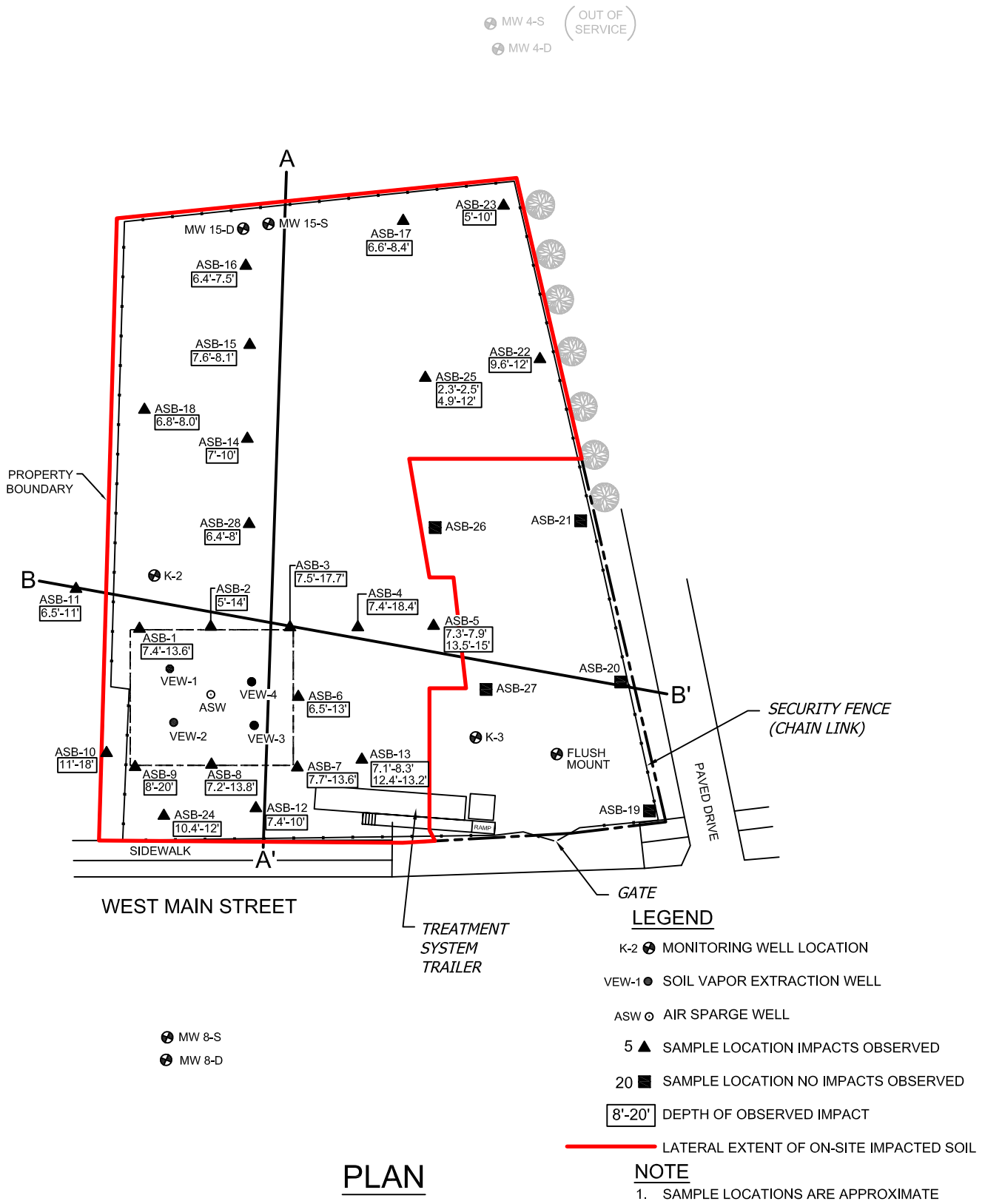


FIGURE 3
BORING LOCATIONS
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK

DATE: JULY 2010

PROJECT NO.: 60135841



GENERAL MAPPING REFERENCE, MAPPING SHOWN COMPILED FROM THE FOLLOWING :



1. PLAN TITLED "EXISTING SITE PLAN" FIGURE 1-2.
2. PLAN TITLED "TREATMENT SYSTEM LAYOUT AND PRE-STARTUP SOIL BORING LOCATIONS" SITE LAYOUT, FIGURE 4-1, BY CAMP DRESSER & MCKEE.
3. SUB-METER GPS SURVEY PERFORMED BY EARTH TECH, NOVEMBER 2007.

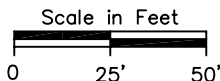
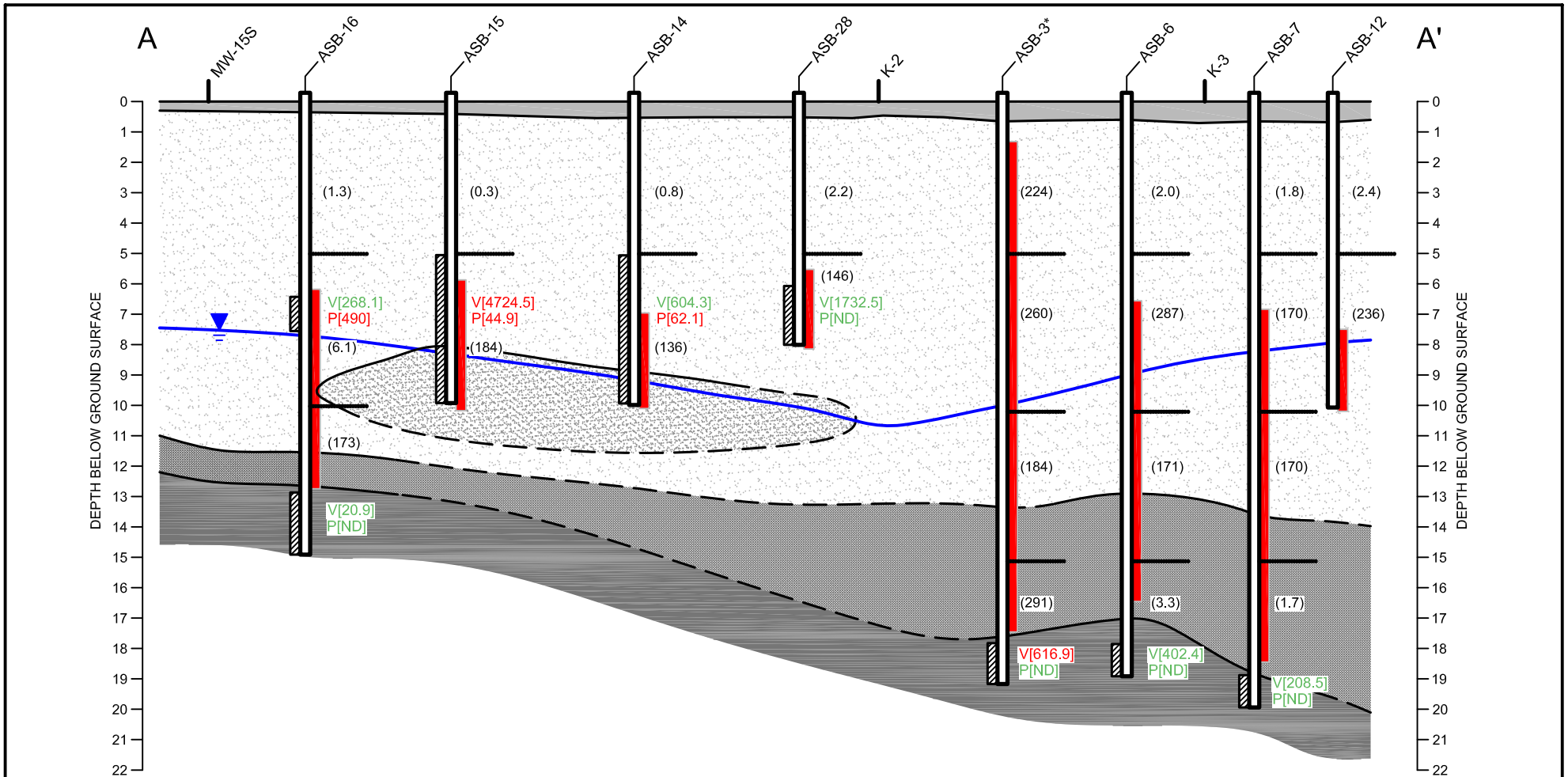


FIGURE 4
 APPROXIMATE LATERAL EXTENT OF IMPACTED SOIL
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK

DATE: JULY 2010

PROJECT NO.: 60135841



LEGEND:

- (1.3) HEAD SPACE OR MAX PID READING (ppm)
 - [604.3] LAB RESULTS - TOTAL VOCs
 - [268.1] LAB RESULTS - TOTAL PESTICIDES
 - [490] RED VALUES EXCEED SCGS
 - WATER TABLE
 - TOP SOIL
 - SAND
 - SILTY SAND
 - CLAYEY SAND/SILT
 - CLAY
 - [ND] NON DETECT
 - HEAD SPACE INTERVAL
 - STAINING OR ODOR
 - SAMPLE LOCATIONS/DEPTHS
 - * EXHIBITED SIGNS OF PENETRATING A PREVIOUS BORING
- 0 14 28
HORIZONTAL SCALE IN FEET
(APPROXIMATE)
- 0 2.5 5
VERTICAL SCALE IN FEET
(APPROXIMATE)
VERTICAL EXAGGERATION 5.5x

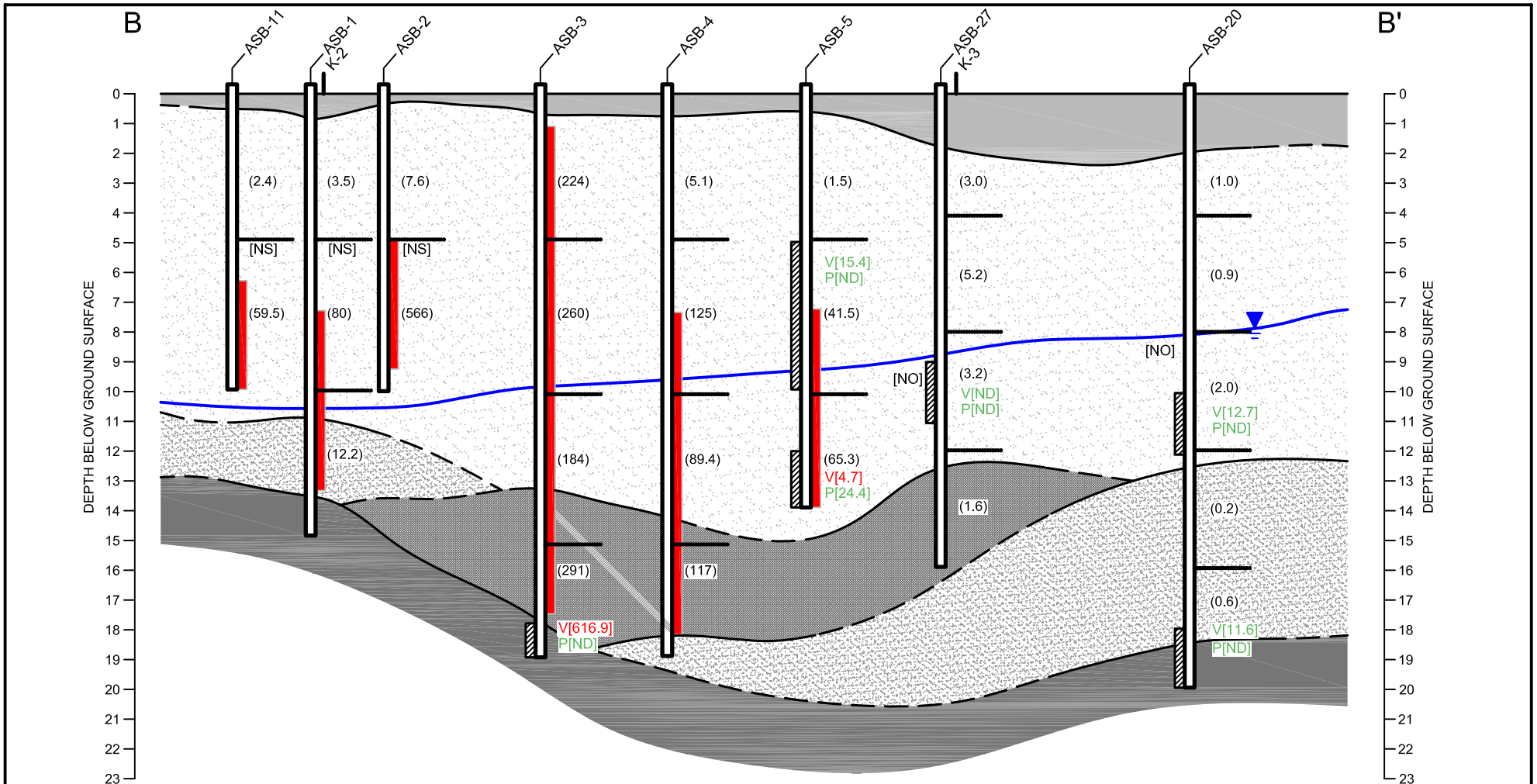
40 British American Blvd.
Latham, New York 12110
T: (518) 951-2200
F: (518) 951-2300

FIGURE 5
CROSS-SECTION A-A'

KORKAY INC.
70 WEST MAIN STREET, BROADALBIN, NEW YORK

60135841

JULY 2010



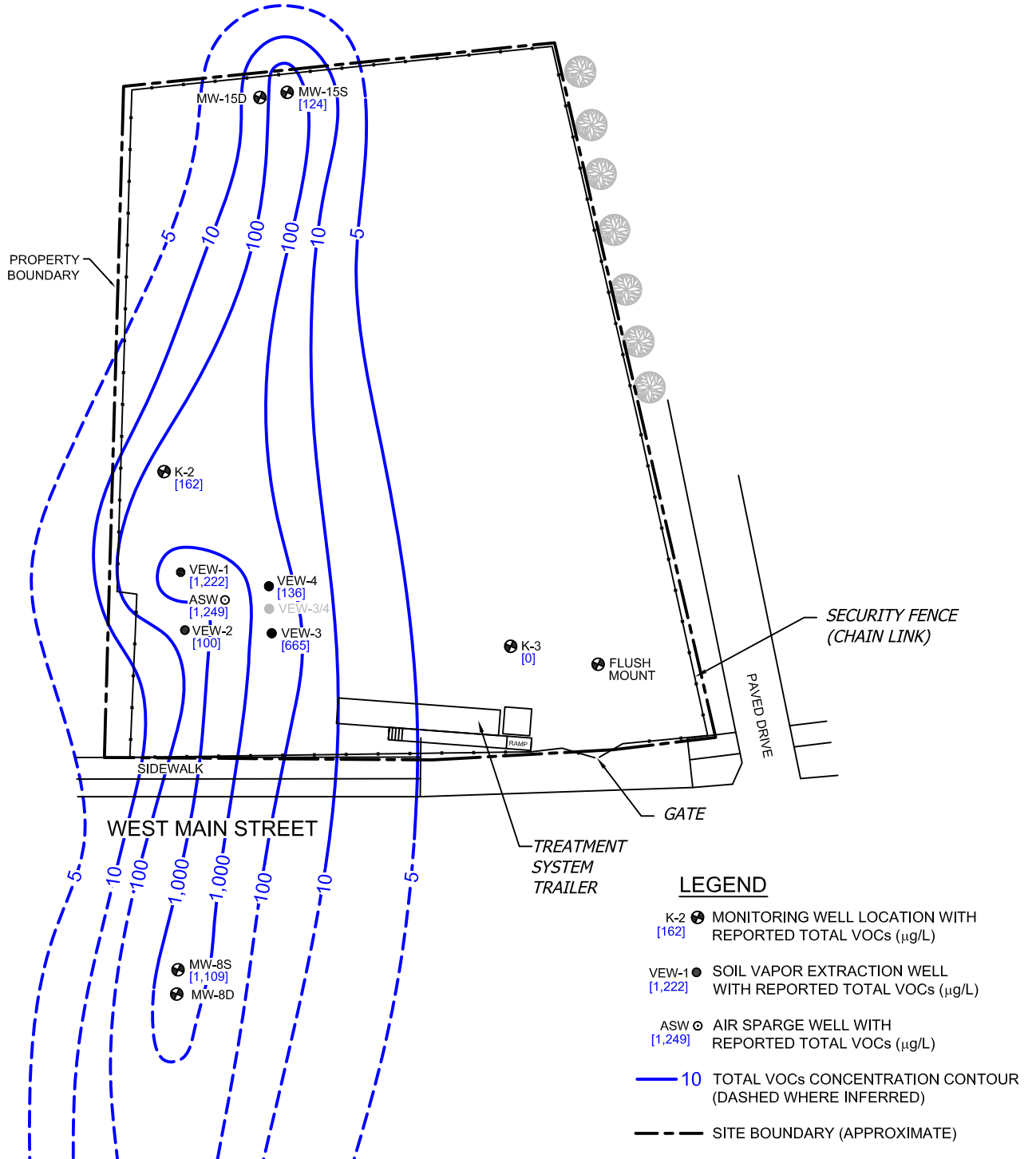
LEGEND:

- | | |
|---|--|
| (2.4) HEAD SPACE OR MAX PID READING (ppm) | [NS] NOT SAMPLED |
| [12.7] LAB RESULTS - TOTAL VOCs | [ND] NON DETECT |
| [24.4] LAB RESULTS - TOTAL PESTICIDES | [NO] STAINING AND/OR ODOR NOT OBSERVED |
| [4.7] RED VALUES EXCEED SCGs | — HEAD SPACE INTERVAL |
| — WATER TABLE | ■ STAINING OR ODOR |
| ■ TOP SOIL | ▨ SAMPLE LOCATIONS/DEPTHS |
| ■ SAND | |
| ■ SILTY SAND | |
| ■ CLAYEY SAND/SILT | |
| ■ CLAY | |
- 0 14 28
 HORIZONTAL SCALE IN FEET
 (APPROXIMATE)
- 5
 2.5
 0
 VERTICAL SCALE IN FEET
 (APPROXIMATE)
 VERTICAL EXAGGERATION 5.5x

	40 British American Blvd. Latham, New York 12110 T: (518) 951-2200 F: (518) 951-2300
--	---

FIGURE 6
CROSS-SECTION B-B'

MW 4-S (OUT OF SERVICE)
 MW 4-D



NOTE:
 FOR MAP REFERENCE INFORMATION,
 SEE FIGURE 1-2 "SITE LAYOUT".

PLAN

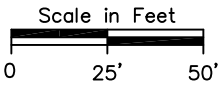


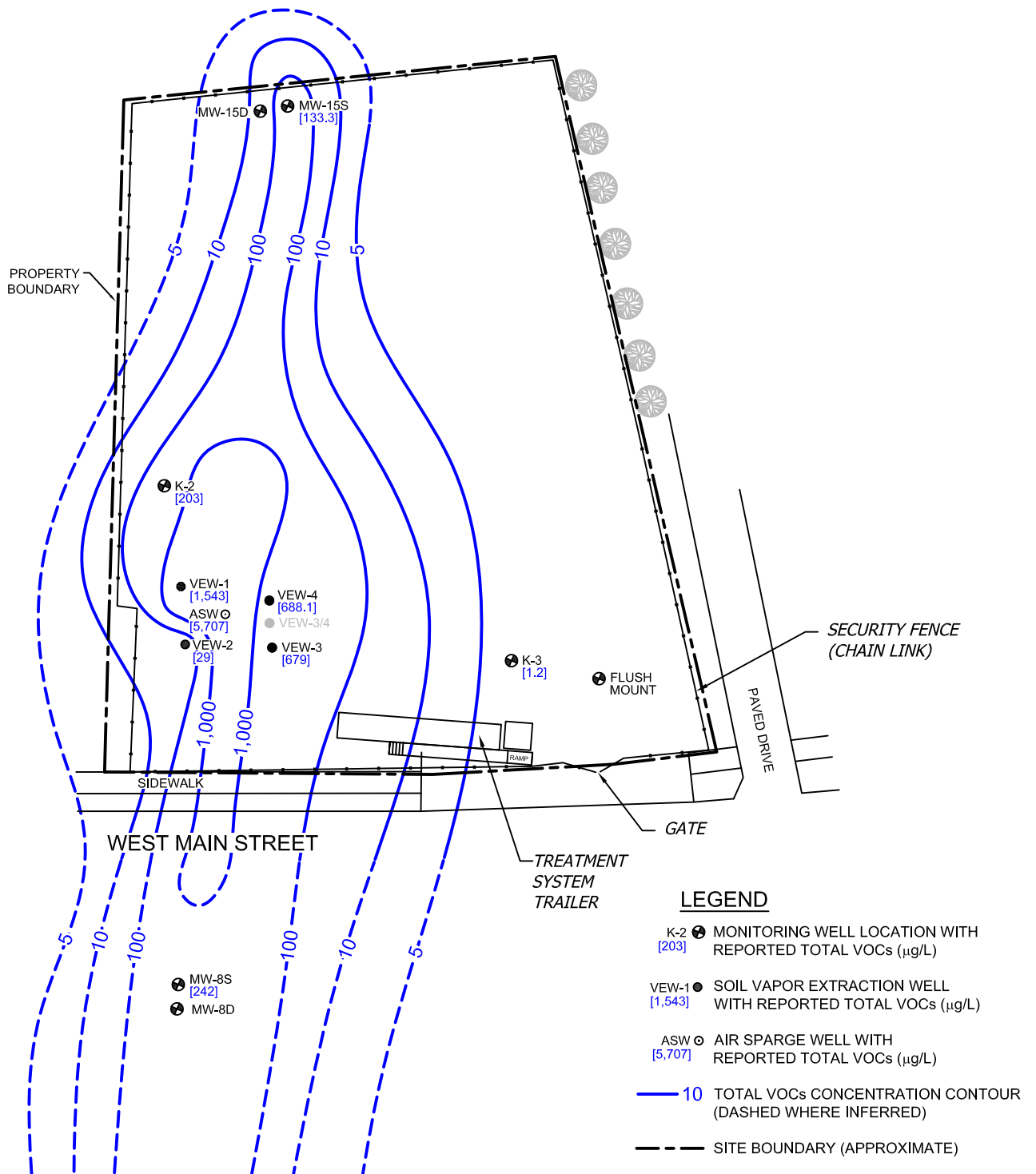
FIGURE 7

TOTAL VOC
 ISOCONCENTRATION MAP - SHALLOW AQUIFER
 AUGUST 14, 2007
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK

DATE: OCTOBER 2013

PROJECT NO.: 60273289

MW 4-S (OUT OF SERVICE)
 MW 4-D



NOTE:
FOR MAP REFERENCE INFORMATION,
SEE FIGURE 1-2 "SITE LAYOUT".

PLAN

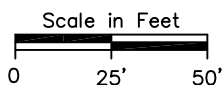


FIGURE 7A

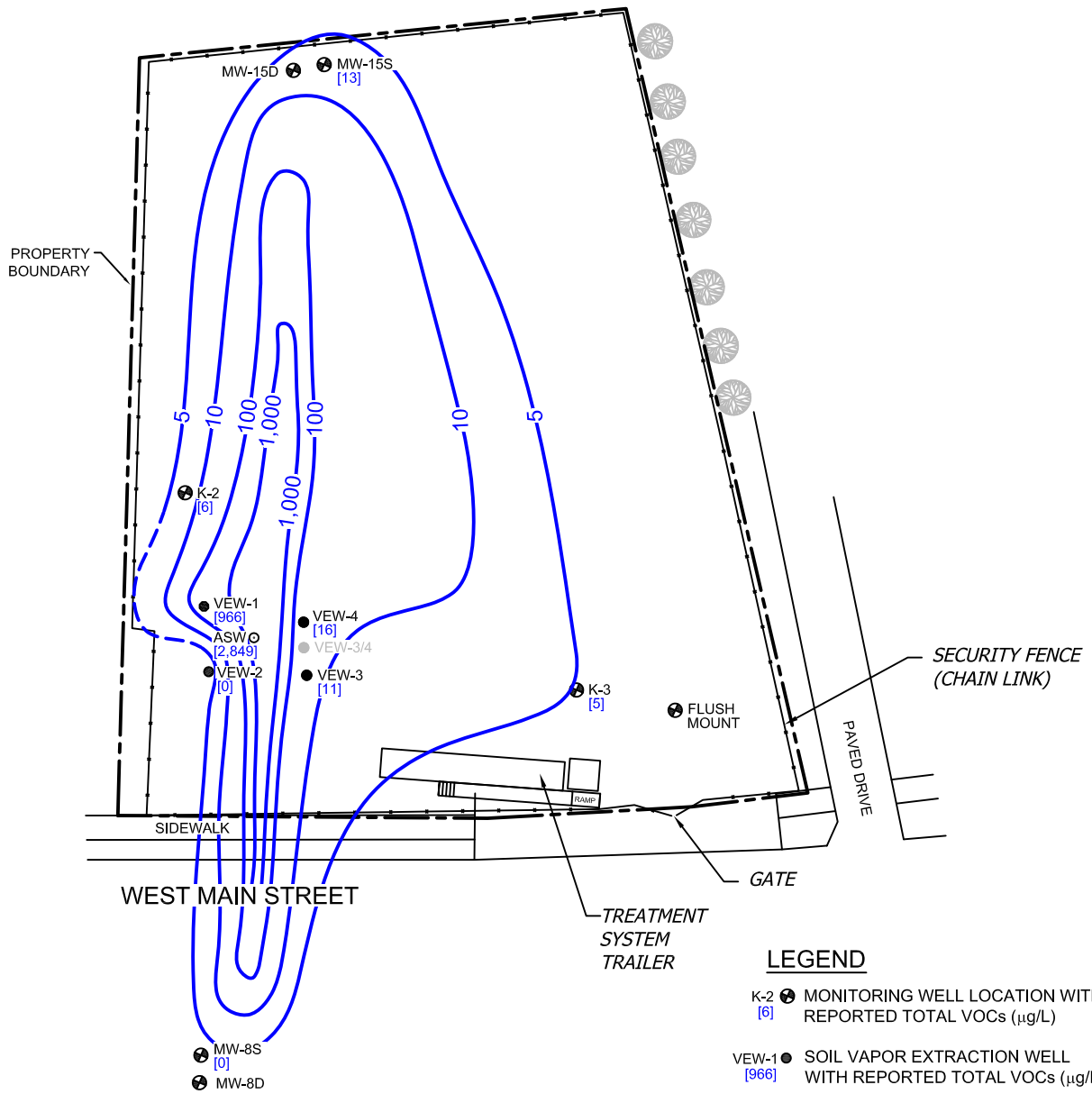
TOTAL VOC
 ISOCONCENTRATION MAP - SHALLOW AQUIFER
 NOVEMBER 25, 2008
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK








DATE: OCTOBER 2013

PROJECT NO.: 60273289

 MW 4-S (OUT OF SERVICE)
 MW 4-D



LEGEND

-  **K-2 [6]** MONITORING WELL LOCATION WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$)
-  **VEW-1 [966]** SOIL VAPOR EXTRACTION WELL WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$)
-  **ASW [2,849]** AIR SPARGE WELL WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$)
-  **10** TOTAL VOCs CONCENTRATION CONTOUR (DASHED WHERE INFERRED)
-  **---** SITE BOUNDARY (APPROXIMATE)

NOTE:
FOR MAP REFERENCE INFORMATION,
SEE FIGURE 1-2 "SITE LAYOUT".

PLAN

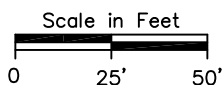


FIGURE 7B

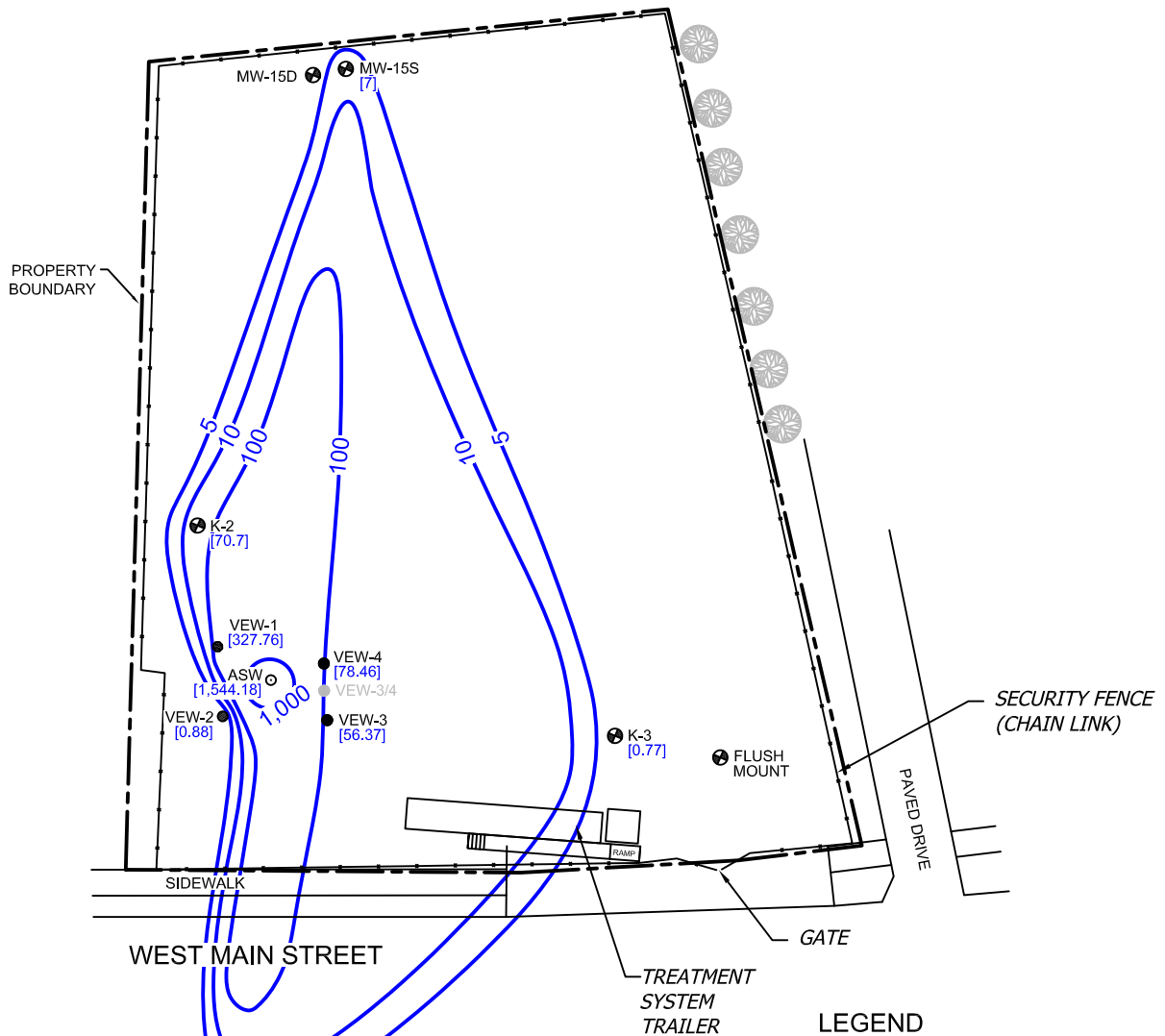
TOTAL VOC
 ISOCONCENTRATION MAP - SHALLOW AQUIFER
 MARCH 25, 2010
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK








DATE: OCTOBER 2013

PROJECT NO.: 60273289

 MW 4-S (OUT OF SERVICE)
 MW 4-D



LEGEND

-  MONITORING WELL LOCATION WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$)
-  SOIL VAPOR EXTRACTION WELL WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$)
-  AIR SPARGE WELL WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$)
-  10 TOTAL VOCs CONCENTRATION CONTOUR (DASHED WHERE INFERRED)
-  SITE BOUNDARY (APPROXIMATE)

NOTE:
FOR MAP REFERENCE INFORMATION,
SEE FIGURE 1-2 "SITE LAYOUT".

PLAN



Scale in Feet

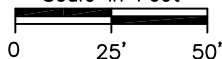


FIGURE 7C

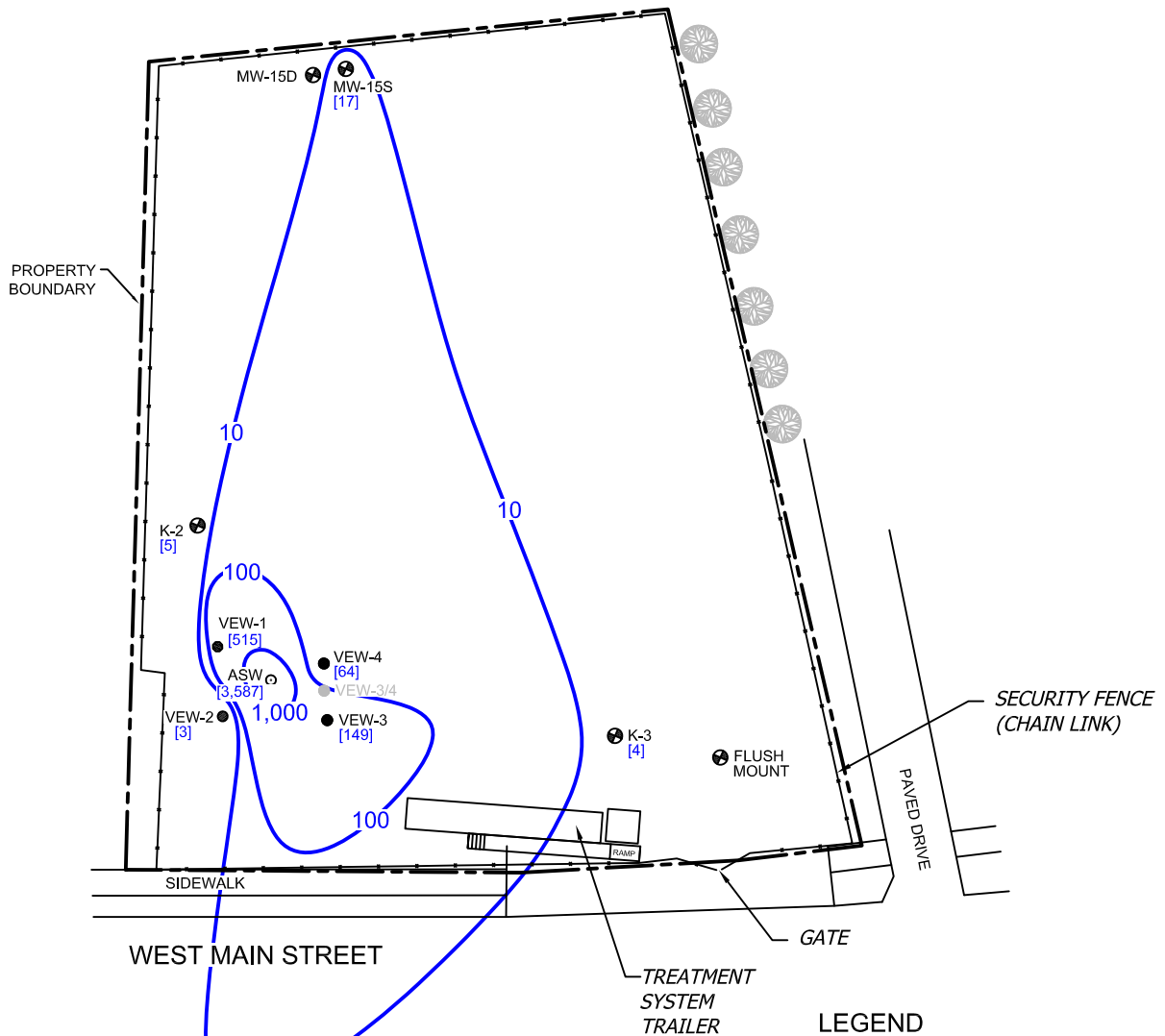
TOTAL VOC
 ISOCONCENTRATION MAP - SHALLOW AQUIFER
 JANUARY 10, 2012
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK



DATE: OCTOBER 2013

PROJECT NO.: 60273289

MW 4-S (OUT OF SERVICE)
 MW 4-D



LEGEND

- K-2 ● MONITORING WELL LOCATION WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$) [70.7]
- VEW-1 ● SOIL VAPOR EXTRACTION WELL WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$) [327.76]
- ASW ○ AIR SPARGE WELL WITH REPORTED TOTAL VOCs ($\mu\text{g/L}$) [1,544.18]
- 10 TOTAL VOCs CONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- - - SITE BOUNDARY (APPROXIMATE)

NOTE:
 FOR MAP REFERENCE INFORMATION,
 SEE FIGURE 1-2 "SITE LAYOUT".

PLAN

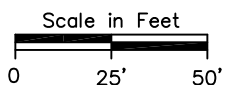


FIGURE 7D

TOTAL VOC
 ISOCONCENTRATION MAP - SHALLOW AQUIFER
 JUNE 25, 2013
 NYSDEC SITE ID: 5-18-014
KORKAY INC.
 70 WEST MAIN STREET
 BROADALBIN, NEW YORK

DATE: OCTOBER 2013

PROJECT NO.: 60273289

TABLES

TABLE 1
Korkay Inc.
Summary of Field Data

Boring	Depth Intervals (feet below ground)	Odor Observed	Visible Staining	PID Reading (Head Space or Average Over Interval in ppm)	Sample Interval	Total Volatile Organic Compounds (µg/kg)	Total Semi-Volatile Organic Compounds (µg/kg)	Total Pesticides (µg/kg)	Comments
ASB-1 (3/11/10)	0-5'	N	N	3.5	No Sample Collected				Odor and staining observed from 7.4-13.6'; slight odor from 13.6-15'; Clay observed at 15'
	5-10'	Y	Y	80.7	No Sample Collected				
	10-15'	Y	Y	12.2	No Sample Collected				
ASB-2 (3/11/10)	0-5'	N	N	7.6	No Sample Collected				Odor and staining observed from 5-8.4'; 10-15' Core had little recovery
	5-10'	Y	Y	566	No Sample Collected				
	10-15'	Y	N	No Data	No Sample Collected				
ASB-3 (3/11/10)	0-5'	Y	Y	224	No Sample Collected				Odor observed from 1.1-17.7' with staining from 1.8-13.1' and 15-17.7'; Mostly clay observed from 17.7-19'
	5-10'	Y	Y	260	No Sample Collected				
	10-15'	Y	Y	184	No Sample Collected				
	15-20'	Y	Y	90.6	18-19'	616.9	ND	ND	
ASB-4 (3/11/10)	0-5'	N	N	5.1	No Sample Collected				Odor and staining observed from 7.4-8.3', 11-11.9', 13.8-14', and 15.4-18.4', with odors observed from 14-15.4' also; Silty clay observed from 18.4-18.7'
	5-10'	Y	Y	125	No Sample Collected				
	10-15'	Y	Y	89.4	No Sample Collected				
	15-20'	Y	Y	117	No Sample Collected				
ASB-5 (3/11/10)	0-5'	N	N	1.5	No Sample Collected				Odor and staining observed from 7.3-7.9' and 13.5-15'
	5-10'	Y	Y	41.5	5-10'	15.4	ND	ND	
	10-15'	Y	Y	65.3	12-14'	24.4	ND	4.7	
ASB-6 (3/11/10)	0-5'	N	N	2.0	No Sample Collected				Odor observed from 6.5-14.2', with staining observed from 6.5-13'; Clayey silt observed from 13-14.2' and clay and fine sand from 17.2-19'
	5-10'	Y	Y	287	No Sample Collected				
	10-15'	Y	Y	171	No Sample Collected				
	15-20'	No Data		3.3	18-19'	402.4	231	ND	
ASB-7 (3/12/10)	0-5'	N	N	1.8	No Sample Collected				Odor and staining observed from 7.7-13.6' and 15-18.9'; Silty clay observed from 13.6-15' and clay with some silt from 18.9-20'
	5-10'	Y	Y	170	No Sample Collected				
	10-15'	Y	Y	170	No Sample Collected				
	15-20'	Y	Y	1.7	19-20'	208.5	ND	ND	
ASB-8 (3/12/10)	0-5'	N	N	3.4	No Sample Collected				Odor and staining observed from 7.2-13.8'; Clay observed at 15'
	5-10'	Y	Y	109	No Sample Collected				
	10-15'	Y	Y	124 Clay @ 15' = 2.4	No Sample Collected				
ASB-9 (3/12/10)	0-5'	N	N	16.1	No Sample Collected				Odor and staining observed from 8-12' and 17.6-20'; Clay observed from 18.2-19.1'
	5-10'	Y	Y	24.8	No Sample Collected				
	10-15'	Y	Y	9.3	No Sample Collected				
	15-20'	Y	Y	195	No Sample Collected				

TABLE 1
Korkay Inc.
Summary of Field Data

Boring	Depth Intervals (feet below ground)	Odor Observed	Visible Staining	Head Space PID Reading or Average Over Interval (ppm)	Sample Interval	Total Volatile Organic Compounds (µg/kg)	Total Semi-Volatile Organic Compounds (µg/kg)	Total Pesticides (µg/kg)	Comments
ASB-10 (3/12/10)	0-5'	N	N	1.5	No Sample Collected				Odor and staining observed from 11.6-13.2'; Clayey silt transitioning into clay observed from 18-18.8' with clay and fine sand from 18.8-20'
	5-10'	N	N	2.6	No Sample Collected				
	10-15'	Y	Y	334	No Sample Collected				
	15-20'	N	N	4.5	19-20'	1,157.30	74	ND	
ASB-11 (3/12/10)	0-5'	N	N	2.4	No Sample Collected				Odor and staining observed from 6.5-8.4'
	5-10'	Y	Y	59.5	No Sample Collected				
ASB-12 (3/12/10)	0-5'	N	N	2.4	No Sample Collected				Odor and staining observed from 7.4-8.8'
	5-10'	Y	Y	236	No Sample Collected				
ASB-13 (3/12/10)	0-5'	N	N	1.6	No Sample Collected				Odor and staining observed from 7.8-8.3' and 12.4-13.2'
	5-10'	Y	Y	1.7	7-9'	90.9	467	ND	
	10-15'	Y	Y	5.1	No Sample Collected				
ASB-14 (3/12/10)	0-5'	N	N	0.8	No Sample Collected				Odor and staining observed from 7.5-9.3'; Silty sand and clay observed from 9-9.3'
	5-10'	Y	Y	136	5-10'	604.3	686	62.1	
ASB-15 (3/12/10)	0-5'	N	N	0.3	No Sample Collected				Odor observed from 5.9-9.3' with staining observed from 5.9-7.3' and 7.6-8.1'; Fine sand with some silt and clay observed from 7.3-7.6' and silty sand and some clay observed from 8.1-9.3'
	5-10'	Y	Y	184	5-10'	4,724.50	938	44.9	
ASB-16 (3/12/10)	0-5'	N	N	1.3	No Sample Collected				Odor observed from 6.4-13.1' with staining observed from 6.4-7.5' and 10-12'; Clayey sand and some silt observed from 12-13.1', clay from 13.1-14.4' and sandy clay and some silt from 14.4-15'
	5-10'	Y	Y	6.1	6.5-7.5'	268.1	ND	490	
	10-15'	Y	Y	173	13-15'	20.9	957	ND	
ASB-17 (3/12/10)	0-5'	N	N	1.8	No Sample Collected				Odor observed from 6.1-8.9' with staining observed from 6.6-7.1' and 7.7-8.4'; Silty clay observed from 8.4-8.9'
	5-10'	Y	Y	28.3	6.5-8.5' 8.5-10'	44.8 7.4	ND/ND ND	82 2.6	
ASB-18 (3/12/10)	0-5'	N	N	1.6	No Sample Collected				Odor observed from 6.2-8.8' with staining from 6.8-8.3'; Fine sand with silt and clay observed from 11.5' and fine sand and silt from 8.3-8.8'
	5-10'	Y	Y	343	8-10'	12,607.30	3,304	1,070	

TABLE 1
Korkay Inc.
Summary of Field Data

Boring	Depth Intervals (feet below ground)	Odor Observed	Visible Staining	Head Space PID Reading or Average Over Interval (ppm)	Sample Interval	Total Volatile Organic Compounds (µg/kg)	Total Semi-Volatile Organic Compounds (µg/kg)	Total Pesticides (µg/kg)	Comments
ASB-19 (3/16/10)	0-4'	No Data		0.9	No Sample Collected				Fine sand with silt and clay observed from 6.2-7.6', a lense of clay and silt from 10.6-10.8', clayey sand and silt from 12.9-14.4' and clay from 14.4-15.7'
	4-8'	No Data		1.6	No Sample Collected				
	8-12'	No Data		4.0	10-12'	9.0	170	ND	
	12-16'	No Data		0.7	13-15'	7.2	240	ND	
ASB-20 (3/16/10)	0-4'	No Data		1.0	No Sample Collected				Clay observed from 18.5-20'
	4-8'	No Data		0.9	No Sample Collected				
	8-12'	No Data		2.0	10-12'	12.7	66	ND	
	12-16'	No Data		0.2	No Sample Collected				
	16-20'	No Data		0.6	18-20'	11.6	ND	ND	
ASB-21 (3/16/10)	0-4'	No Data		2.3	No Sample Collected				Sandy clay and silt observed from 12-13.1' transitioning into clay from 13.1-15.8' then fine sand with clay and silt from 15.8-16'
	4-8'	No Data		1.5	6-8'	10.1	ND	ND	
	8-12'	No Data		1.8	10-12'	7.3	ND	ND	
	12-16'	No Data		0.6	13-15'	9.7	ND	ND	
ASB-22 (3/16/10)	0-4'	No Data		0.8	No Sample Collected				Odor and staining observed from 9.6-11.8'; Clay observed from 12.15.4', fine sand, silt and clay from 15.4-16'
	4-8'	No Data		11.2	No Sample Collected				
	8-12'	Y	Y	88.2	10-12'	21.4	77	44	
	12-16'	N	N	1.0	13-15'	20.9	ND	ND	
ASB-23 (3/16/10)	0-4'	N	N	3.2	No Sample Collected				Odor and staining observed from 5-10.4'; Fine sand, silt and clay observed from 10-12'
	4-8'	Y	Y	203	6-8'	302.3	419	320	
	8-12'	Y	Y	119 Clay @ 12' = 0.8	10-12'	642.5	ND	194	
ASB-24 (3/16/10)	0-4'	N	N	3.5	No Sample Collected				Odor and staining observed from 10.4-12'
	4-8'	N	N	2.2	No Sample Collected				
	8-12'	Y	Y	1.2	11-12'	91,217	2,155	ND	
ASB-25 (3/16/10)	0-4'	Y	Y	17.9	No Sample Collected				Odor and staining observed from 2.3-2.5' and 4.9-12'; Clay observed from 12-14.3', fine sand, clay and silt from 14.3-16'
	4-8'	Y	Y	373	6-8'	57,279.10	5,527	133	
	8-12'	Y	Y	1,269	9-11'	56,772.50	4,360	121	
	12-16'	N	N	12.1	No Sample Collected				
ASB-26 (3/16/10)	0-4'	N	N	1.8	No Sample Collected				Fine sand, silt and clay observed from 2.2-2.4'; Void space encountered at approximately 8'
	4-8'	N	N	1.7	No Sample Collected				
	8-12'	No Data		0.1	No Sample Collected				

TABLE 1
Korkay Inc.
Summary of Field Data

Boring	Depth Intervals (feet below ground)	Odor Observed	Visible Staining	Head Space PID Reading or Average Over Interval (ppm)	Sample Interval	Total Volatile Organic Compounds (µg/kg)	Total Semi-Volatile Organic Compounds (µg/kg)	Total Pesticides (µg/kg)	Comments
ASB-27 (3/16/10)	0-4'	N	N	3.0	No Sample Collected				Sandy clay and silt observed from 12.7-13.9'
	4-8'	N	N	5.2	No Sample Collected				
	8-12'	N	N	3.2	9-11'	ND	ND	ND	
	12-16'	N	N	1.6	No Sample Collected				
ASB-28 (3/16/10)	0-4'	N	N	2.2	No Sample Collected				Odor and staining observed from 6.4-8.5'
	4-8'	Y	Y	146	6-8'	1,732.50	ND	ND	

CHARTS

Chart 1
Source Area Wells Groundwater TVOC Concentration Trends
Korkay Inc.

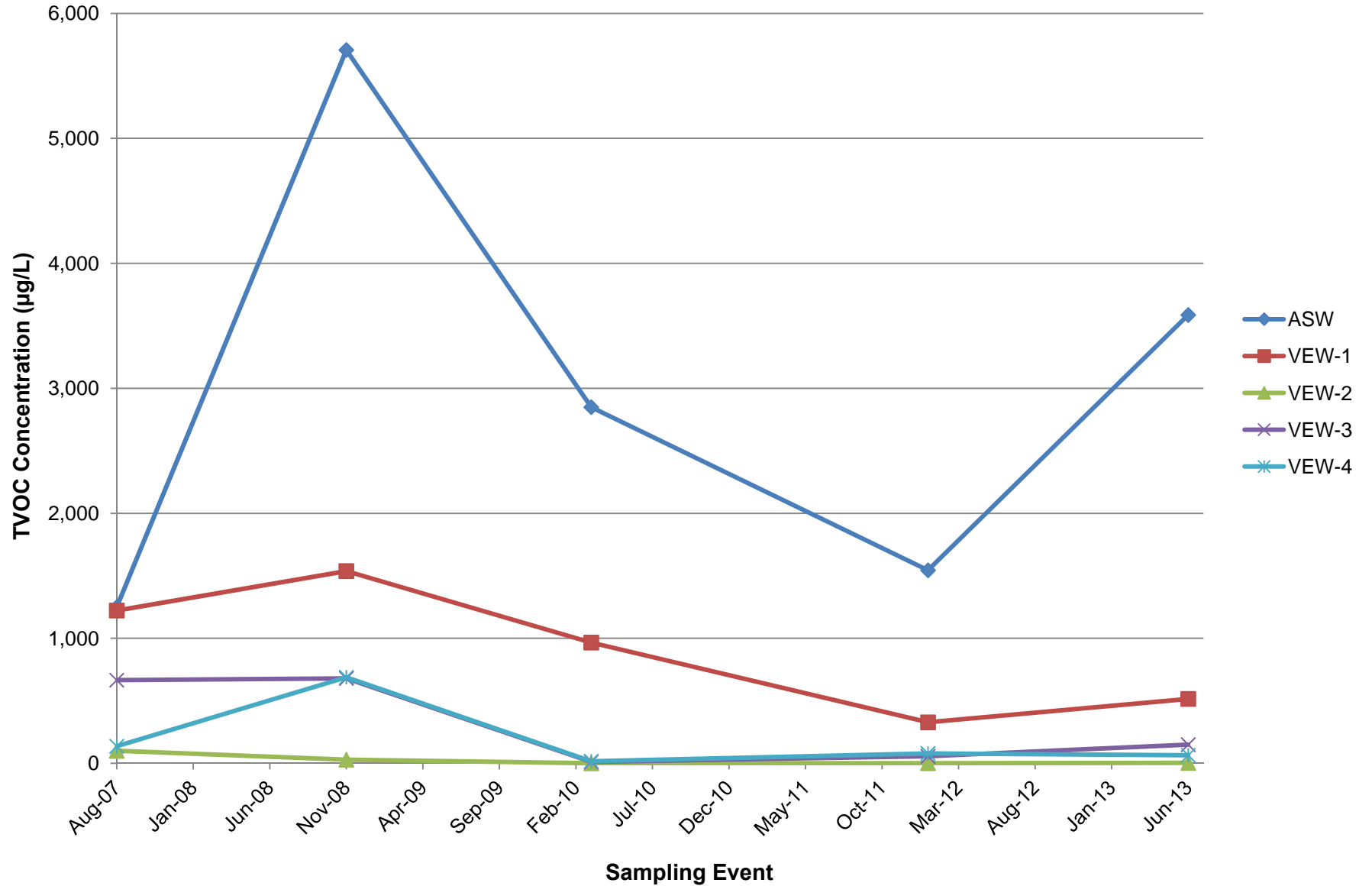
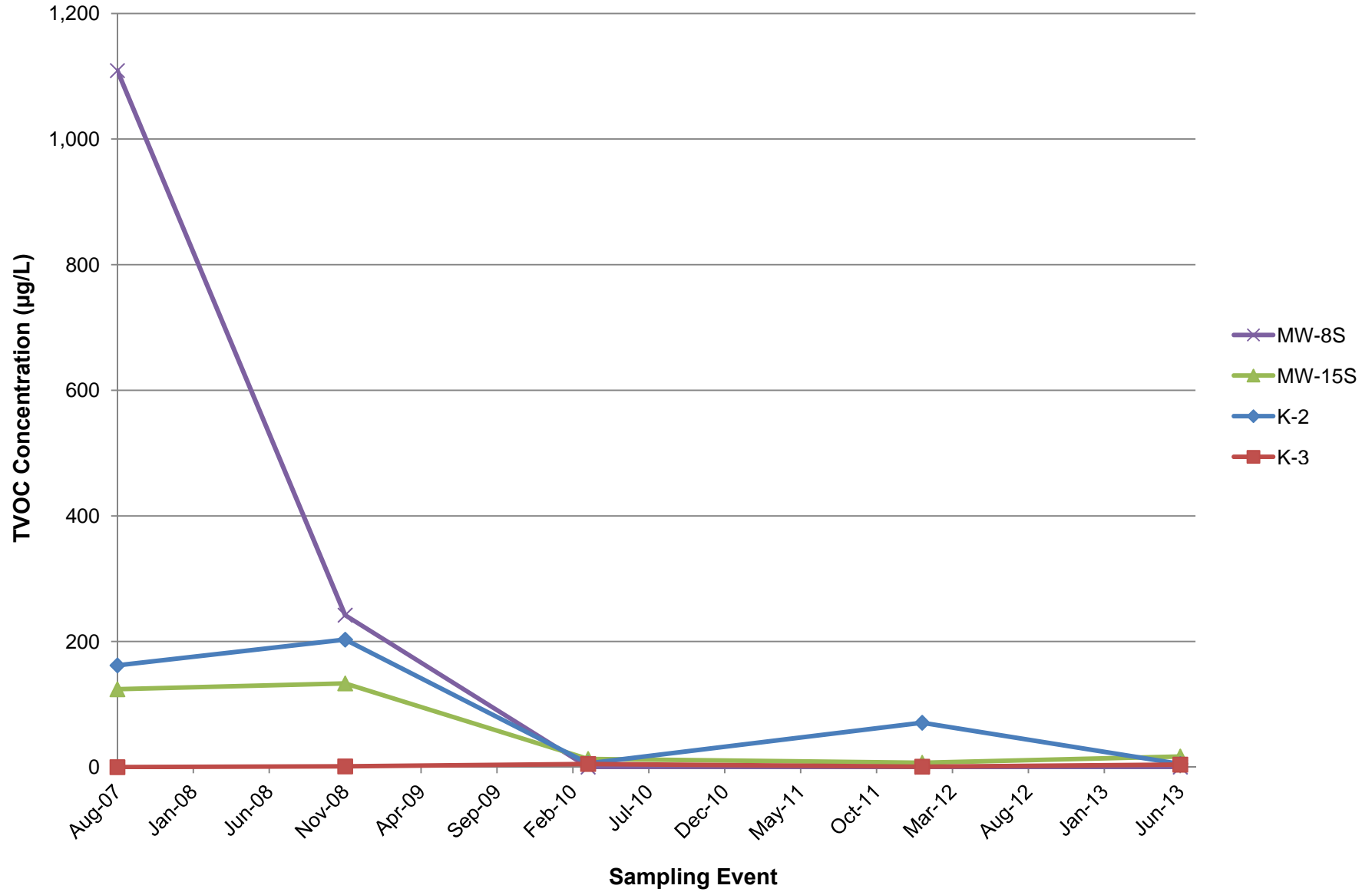


Chart 2
Boundary Wells Groundwater TVOC Concentration Trends
Korkay Inc.



APPENDIX A

Environmental Notice

FULTON COUNTY CLERK

WILLIAM E. ESCHLER

Receipt

Receipt Date: 02/01/2013 11:38:20 AM
RECEIPT # 2013229249

Recording Clerk: FC
Cash Drawer: CASH1
Rec'd Frm: INDEPENDENT

Instr#: 2013-18049
DOC: MISC DOCUMENT
OR Party: NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION DEPARTMENT
EE Party: PERMA GLAZE CHEMICAL
CORPORATION

STANDARD	
Cover Page	\$5.00
Recording Fee	\$50.00
Cultural Ed	\$14.25
Records Management - County	\$1.00
Records Management - State	\$4.75

DOCUMENT TOTAL: ----> \$75.00

Receipt Summary
TOTAL RECEIPT: ----> \$75.00
TOTAL RECEIVED: ----> \$75.00

CASH BACK: ----> \$0.00

PAYMENTS
Check # 3612 -> \$75.00

COPY

FILED
FULTON COUNTY
CLERK'S OFFICE

Korkay, Incorporated
Site No. 518014
70 West Main Street
Broadalbin, Fulton County, NY
Tax Map: 137.15-5-25

2013 FEB -1 AM 11:38
ENVIRONMENTAL NOTICE

RECEIVED

THIS ENVIRONMENTAL NOTICE is made the 25th day of January 20 13 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 70 West Main Street in the Village of Broadalbin, County of Fulton and State of New York, known and designated on the tax map of the County Clerk of the County of Fulton as tax map parcel number: Section 137.15 Block 5 Lot 25 which is part of lands conveyed by Kaldar, Inc. to the Perma Glaze Chemical Corporation by deed dated March 31, 1970 and recorded on October 4, 1971, in Book Liber 515 of Deeds at page 238 from the County of Fulton, the property being more particularly described in the metes and bounds and tax map 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 Operation and Maintenance ("O&M"), Plan 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).

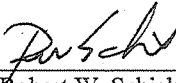
THIRD, no person shall disturb, remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls required for the Remedy, including but not limited to those engineering controls described in the O&M Plan and listed below, unless in each instance they first 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 the site.

FIFTH, 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 the site.

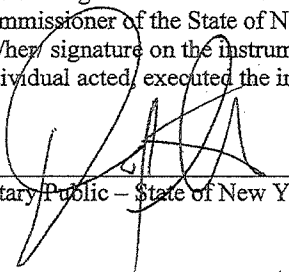
SIXTH, it is a violation of 6 NYCRR 375-1.11(b) to use the Property in a manner inconsistent with this environmental notice.

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

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

STATE OF NEW YORK) ss:
COUNTY OF ALBANY)

On the 2nd day of JANUARY, in the year 2013, before me, Robert. W. Schick, the undersigned, personally appeared, and is personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.


Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2014

Korkay, Incorporated
Site No. 518014
70 West Main Street
Broadalbin, Fulton County, NY
Tax Map: 137.15-5-25

Appendix A

METES and BOUNDS Description

ALL THAT TRACT, PIECE OR PARCEL OF LAND, situate, in the Town of Broadalbin, County of Fulton, and State of New York, bounded and described as follows:

PARCEL NO. 1.

Beginning at an iron post on Main Street, 640 feet westerly from the inside of the sidewalk on First Avenue, in the Village of Broadalbin, County of Fulton and State of New York; running thence north $11^{\circ}10'$ west, to an iron post, and continuing thence northerly to an iron post which is 222 feet more or less northerly from the iron post on Main Street heretofore mentioned; running thence in a westerly direction along the lands now or formerly belonging to the Estate of George W. Hughest, deceased; running thence in a southerly direction along the lands formerly owned by William Kennedy, now or formerly owned by Etta Perkins; and running thence in an easterly direction along Main Street in said Village to the first mentioned iron post and point and place of beginning.

PARCEL NO. 2.

COMMENCING at a point on the northerly side of West Main Street in said Village at a point approximately 640 feet westerly from the inside of the sidewalk on First Avenue in said Village; running thence Northeasterly, along the east line of lands now owned or supposed to be by Crossley Glove Co., Inc., a distance of approximately 250 feet to the south line of lands of E. C. and K. Tanner; running thence EASTERLY along the south line of land of said E. C. and K. Tanner a distance of approximately 90 feet to the west line of the lands now owned or supposed to be by the First Presbyterian Church of Broadalbin, New York; running thence SOUTHEASTERLY along the westerly line of lands of said First Presbyterian Church a distance of approximately 250 feet to the north line of West Main Street in said Village; running thence WESTERLY along the north line of West Main Street a distance of approximately 120 feet to the point and place of beginning, together with dwelling-house thereon.

All measurements in the above description being the same more or less.

Being the same premises conveyed to Kaldar, Inc. by Warranty Deed from M&W Glove Corp., formerly known as Crossley Glove Co., Inc. dated May 26, 1969, and recorded May 27, 1969, in the Fulton County Clerk's Office in Book 502 of Deeds at Page 1129.

Korkay, Incorporated
Site No. 518014
70 West Main Street
Broadalbin, Fulton County, NY
Tax Map: 137.15-5-25

Appendix B

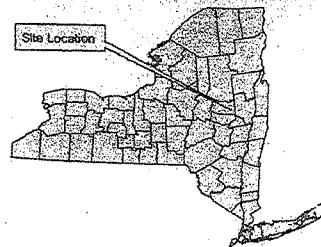
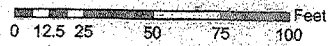


Korkay Site Location



518014
70 West Main Street
Broadalbin, NY

Project Manager: Payson Long
Map Created By: Payson Long
Date Created: February 17, 2012



APPENDIX B

Enclosure 1- IC/EC Certification Forms



Enclosure 1
Engineering Controls - Engineering Standby Contractor Certification Form



	Site Details	Box 1
Site No. 518014		
Site Name Korkay, Incorporated		
Site Address: 70 West Main Street	Zip Code: 12025	
City/Town: Broadalbin		
County: Fulton		
Site Acreage: 1.2		
Reporting Period: January 15, 2007 to September 16, 2013		
		YES NO
1. Is the information above correct?		<input checked="" type="checkbox"/> <input type="checkbox"/>
If NO, include handwritten above or on a separate sheet.		
2. To your knowledge has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?		<input type="checkbox"/> <input checked="" type="checkbox"/>
3. To your knowledge has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?		<input type="checkbox"/> <input checked="" type="checkbox"/>
4. To your knowledge have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?		<input type="checkbox"/> <input checked="" type="checkbox"/>
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. To your knowledge is the site currently undergoing development?		<input type="checkbox"/> <input checked="" type="checkbox"/>
		Box 2
		YES NO
6. Is the current site use consistent with the use(s) listed below? Commercial and Industrial		<input checked="" type="checkbox"/> <input type="checkbox"/>
7. Are all ICs/ECs in place and functioning as designed?		<input checked="" type="checkbox"/> <input type="checkbox"/>
IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.		
_____ Signature of Engineering Standby Contractor		_____ Date

SITE NO. 518014

Box 3

Description of Institutional Controls

Parcel

137.15-5-25

Owner

PERMA GLAZE CHEMICAL CORP

Institutional Control

Ground Water Use Restriction
Landuse Restriction

The ICs at the site are groundwater use restriction and and land use restrictions.

Box 4

Description of Engineering Controls

Parcel

137.15-5-25

Engineering Control

Fencing/Access Control

ECs include Site Fencing/Access Control. Must ensure the perimeter fence is intact.

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification, including data and material prepared by previous contractors for the current certifying period, if any;

b) 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 is accurate and complete.

YES NO

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

(a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

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

(c) nothing has occurred that would constitute a failure to comply with the Site Management Plan, or equivalent if no Site Management Plan exists.

YES NO

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.

Signature of Engineering Standby Contractor

Date

IC/EC CERTIFICATIONS

Box 6

Qualified Environmental Professional Signature

I certify that all information in Boxes 2 through 5 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 SCOTT A. UNDERHILL at AECOM
print name

40 BRITISH AMERICAN BOULEVARD

LATHAM, NY 12110
(print business address)

am certifying as a Qualified Environmental Professional.

Scott A. Underhill
Signature of Qualified Environmental Professional



3-12-14
Date

Appendix D
Soil Boring and
Monitoring Well
Construction Logs

Project: Korkay Client: NYSDEC Well No: VEW-1

DRILLING SUMMARY

Drilling Co: SJB Services Drillers: J. Lamm
 Drill Rig Make/Model: CME 75
 Borehole Diameters: 8" Drilling Fluid: None
 Bits/Depths: 4 1/4" Hollow Stem Auger
 Total Depth: 9.3' b.g. Depth to Water: ± 8' b.g.
 Supervisory Geologist: R. Chenecko

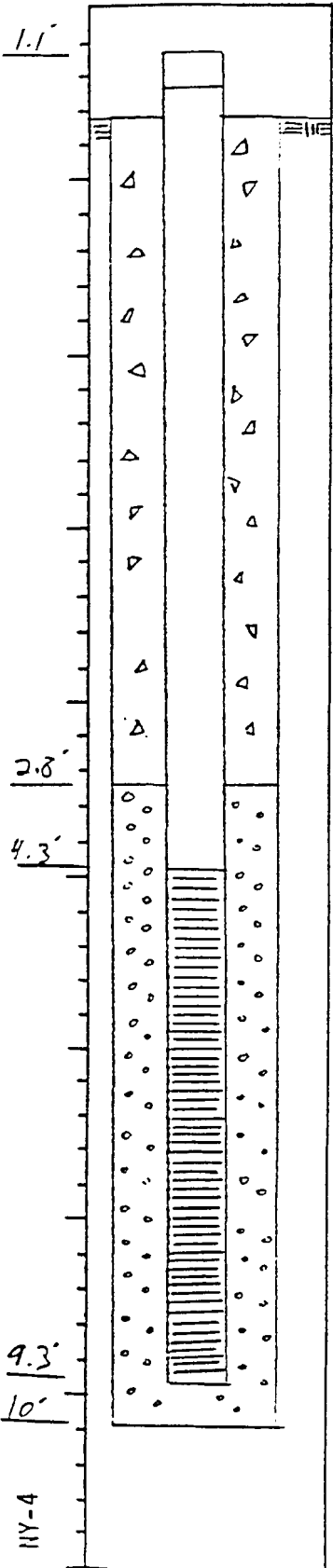
WELL DESIGN

Casing Material: Sch 40 PVC Diameter: 2-inch Length: 5.4'
 Screen Material: Sch 40 PVC Diameter: 2-inch Length: 5.0'
 Slot Size: 10 slot Setting: 4.3' to 9.3' b.g.
 Filter Material: No. 0 Merie Setting: 2.8' to 10' b.g.
 Seals Material: NA Setting: NA
 Grout: Type I Cement / bentonite Setting: 0 to 2.8' b.g.
 Surface Casing Material: NA Setting: NA

TIME LOG	Started	Completed
Drilling:	<u>10/6/94</u>	<u>10/6/94</u>
Installation:	<u>10/6/94</u>	<u>10/6/94</u>
Development:	<u>NA</u>	<u>NA</u>

WELL DEVELOPMENT

Method: NA
 Static Depth to Water: 8.87' TOC (water column = 1.53')
 Pumping Depth to Water: NA
 Pumping Rate: NA Specific Capacity: NA
 Volume Pumped: NA



CDM

environmental engineers, scientists,
planners & management consultants

BORING NUMBER: VEW-1

Page 1 of 1

Log of Boring

Project Korkay Location Broadalbin, NY Job. No. _____
 Date Drilled 10/6/94 Drilling Co. SJB Services
 Total Depth 8' Method Used Hollow Stem Auger
 Inspector R Cherenko Organic Vapor Instruments Used HANU Water Table Depth 8'

Depth (feet)	Samp. No.	Blows per 6" / 140 lbs.	Sample Interval	Adv./Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
1	1	2 4 4 4	0'-2'	$\frac{2.0'}{1.0'}$	70	Dark gray and brown f ⁱⁿ SAND, trace silt.		
2	2	4 4 5 5	2'-4'	$\frac{2.0'}{1.5'}$	3	Tan m. SAND, trace f, c sand		
4	3	5 7 7 8	4'-6'	$\frac{2.0'}{1.6'}$	200	Gray and tan m SAND, trace c, f sand. Bottom 0.2' stained black		
6	4	5 7 7 8	6'-8'	$\frac{2.0'}{1.5'}$	300	Black (stained) m SAND, trace c, f sand.		VEW-1-7.5 TCL VOA
8								

CDM

environmental engineers, scientists,
planners & management consultants

WELL CONSTRUCTION SUMMARY

Project: Korkay Client: NYSDEC Well No: VEW-2

DRILLING SUMMARY

Drilling Co: SJB Services Drillers: J. Lamm
 Drill Rig Make/Model: CME 75
 Borehole Diameters: 8" Drilling Fluid: None
 Bits/Depths: 4 1/4" Hollow Ste. Auger
 Total Depth: 9.4' b.g. Depth to Water: ± 8' b.g.
 Supervisory Geologist: R. Chenecko

WELL DESIGN

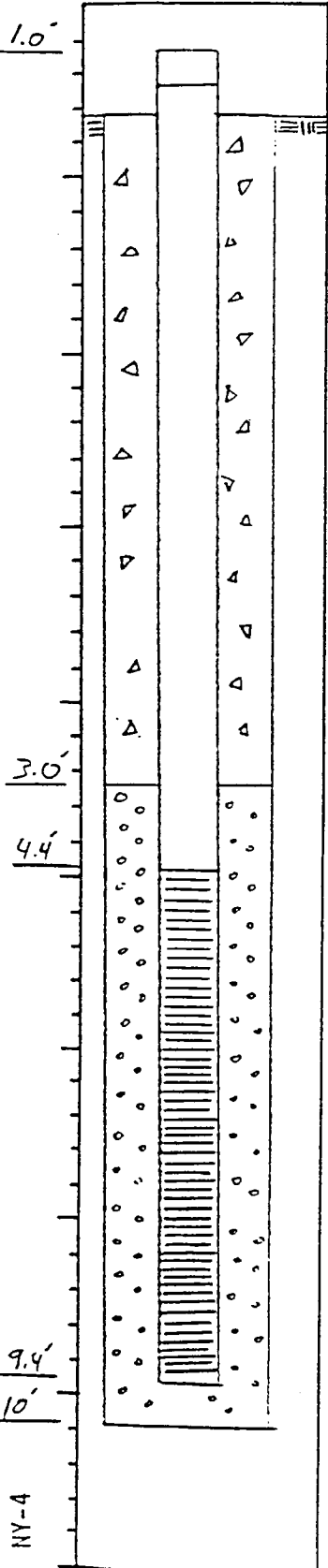
Casing Material: Sch 40 PVC Diameter: 2-inch Length: 5.4'
 Screen Material: Sch 40 PVC Diameter: 2-inch Length: 5.0'
 Slot Size: 10 slot Setting: 4.4' to 9.4' b.g.
 Filter Material: No. 0 Merie Setting: 3.0' to 10' b.g.
 Seals Material: NA Setting: NA
 Grout: Type I Cement / Bentonite Setting: 0' to 3.0' b.g.
 Surface Casing Material: NA Setting: NA

TIME LOG

	Started	Completed
Drilling:	<u>10/5/94</u>	<u>10/5/94</u>
Installation:	<u>10/5/94</u>	<u>10/5/94</u>
Development:	<u>NA</u>	<u>NA</u>

WELL DEVELOPMENT

Method: NA
 Static Depth to Water: 8.85' TOC (water column = 1.55')
 Pumping Depth to Water: NA
 Pumping Rate: NA Specific Capacity: NA
 Volume Pumped: NA



Log of Boring

Project Korkay Location Broadalbin, NY Job. No. _____
 Date Drilled 10/5/94 Drilling Co. SJA Services
 Total Depth 8' Method Used Hollow Stem Auger
 Inspector A Cherenko Organic Vapor Instruments Used HNV Water Table Depth 8'

Depth (feet)	Samp. No.	Blows Per 6" / 140 lbs.	Sample Interval	Adv./Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
1	1	2	0'-2'	2.0'	0	Brown m SAND fill		
	2	2		0.5'				
2	2	4 4	2'-4'	2.0'	0.2	0.4' Brown m-c SAND trace gravel		
		5 5		0.8'				
4	3	7 7	4'-6'	2.0'	1	0.7' Black c sand and gravel fill		
		7 7		1.5'				
6	4	6 5	6'-8'	2.0'	0.2-5 increase downward	0.5' Tan and orange m-c SAND		
		5 4		1.6'				
8						0.4' Gray f SAND, trace s.H. Black streaks		
						0.5' Gray m SAND		
						0.2' Gray f SAND tr. silt: wet		

VEW-2-7.5
TCL VOL

CDM

environmental engineers, scientists,
planners & management consultants

WELL CONSTRUCTION SUMMARY

Project: Korkay Client: NYSDEC Well No: VEW-3

DRILLING SUMMARY

Drilling Co: SJB Services Drillers: J. Lamm
 Drill Rig Make/Model: CME 75
 Borehole Diameters: 8" Drilling Fluid: None
 Bits/Depths: 4 1/4" Hollow Ste. Auger
 Total Depth: 9.0' S.g. Depth to Water: ±8' S.g.
 Supervisory Geologist: R. Chenecko

WELL DESIGN

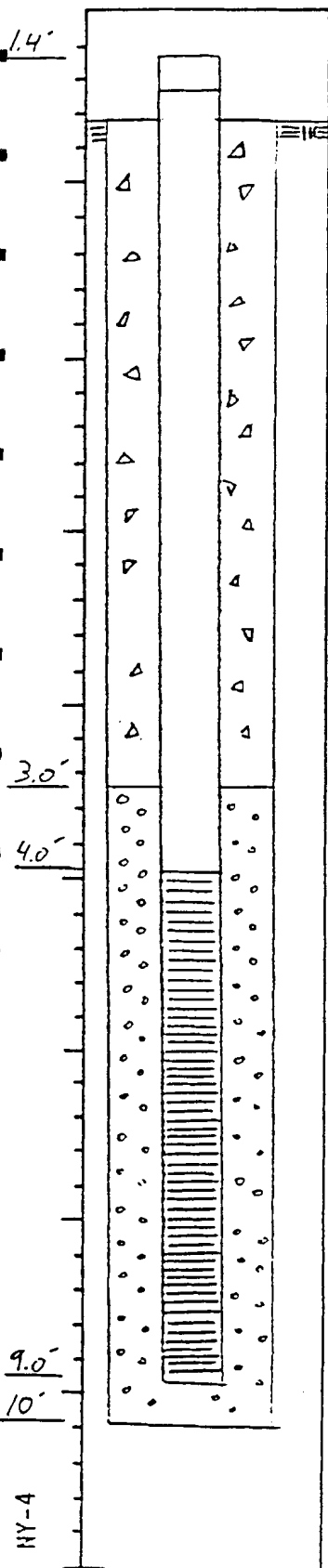
Casing Material: Sch 40 PVC Diameter: 2-inch Length: 5.4'
 Screen Material: Sch 40 PVC Diameter: 2-inch Length: 5.0'
 Slot Size: 10 slot Setting: 4.0' to 9.0' S.g.
 Filter Material: No. 20 Mesh Setting: 3.0' to 10.0' S.g.
 Seals Material: NA Setting: NA
 Grout: Type I Cement / Bentonite Setting: 0' to 3.0' S.g.
 Surface Casing Material: NA Setting: NA

TIME LOG

	Started	Completed
Drilling:	<u>10/4/94</u>	<u>10/4/94</u>
Installation:	<u>10/4/94</u>	<u>10/4/94</u>
Development:	<u>NA</u>	<u>NA</u>

WELL DEVELOPMENT

Method: NA
 Static Depth to Water: 9.41 TOC (Water column = 0.99')
 Pumping Depth to Water: NA
 Pumping Rate: NA Specific Capacity: NA
 Volume Pumped: NA



CDM

environmental engineers, scientists,
planners & management consultants

WELL CONSTRUCTION SUMMARY

Project: Kockay Client: NYDEC Well No: VEW-4

DRILLING SUMMARY

Drilling Co: SJB Services Drillers: J. Lamm
 Drill Rig Make/Model: CME 75
 Borehole Diameters: 8" Drilling Fluid: None
 Bits/Depths: 4 1/4" Hollow Stem Auger
 Total Depth: 8.8' b.g. Depth to Water: 1.8' b.g.
 Supervisory Geologist: R. Chenecko

WELL DESIGN

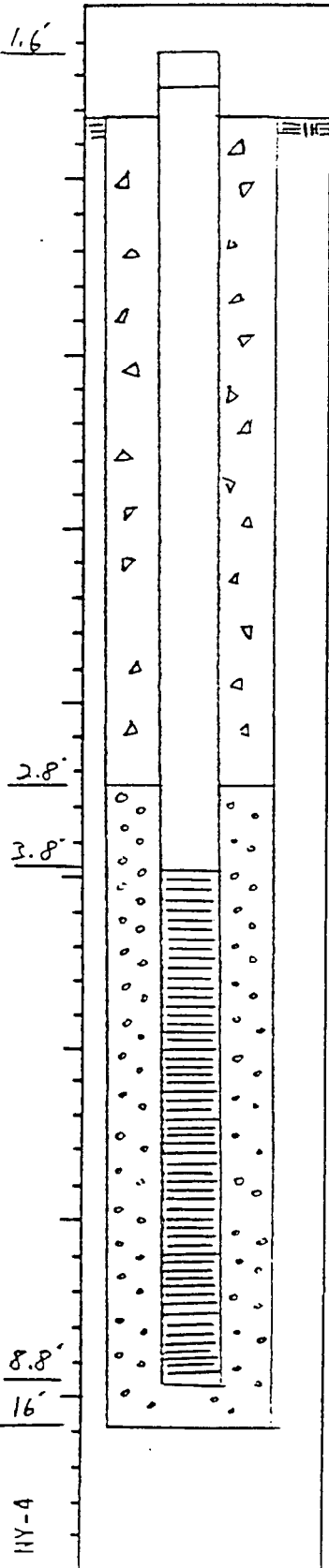
Casing Material: Sch 40 PVC Diameter: 2-inch Length: 5.4'
 Screen Material: Sch 40 PVC Diameter: 2-inch Length: 5.0'
 Slot Size: 10 slot Setting: 3.8' to 8.8' b.g.
 Filter Material: No. 0 Merie Setting: 2.8' to 16' b.g.
 Seals Material: NA Setting: NA
 Grout: Type I Cement / bentonite Setting: 0' to 2.8' b.g.
 Surface Casing Material: NA Setting: NA

TIME LOG

	Started	Completed
Drilling:	<u>10/4/94</u>	<u>10/4/94</u>
Installation:	<u>10/4/94</u>	<u>10/4/94</u>
Development:	<u>NA</u>	<u>NA</u>

WELL DEVELOPMENT

Method: NA
 Static Depth to Water: 9.58' TOC (water column = 0.82')
 Pumping Depth to Water: NA
 Pumping Rate: NA Specific Capacity: NA
 Volume Pumped: NA



Log of Boring

Project Korkay Location Broadellin, NY Job. No. _____
 Date Drilled 10/4/94 Drilling Co. SJB Services
 Total Depth 16' Method Used Hollow Stem Auger
 Inspector A. Chenevix Organic Vapor Instruments Used HVU Water Table Depth 8'

Depth (feet)	Samp. No.	Blows per 6" / 140 lbs.	Sample Interval	Adv./Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
1	1	5 2 2 3	0'-2'	$\frac{2.0'}{0.3'}$	0	Brown m SAND, roots. Organic		
2	2	3 4 3 3	2'-4'	$\frac{2.0'}{1.1'}$	2	Brown f-m SAND, trace gravel		SB-2 2-4 TCL/TAL
4	3	3 3 2 3	4'-6'	$\frac{2.0'}{1.3'}$	15	0.9' Brown f-m SAND, tr. silt, gravel 0.4' Tan and orange mic SAND (lower HVU)		SB-2 4-6 TCL/TAL
6	4	2 2 1 1	6'-8'	$\frac{2.0'}{1.0'}$	200	Black (stained) m-f SAND trace silt. Petroleum odor.		Duplicates: SB-2 6-8 SB-2 20-200 TCL/TAL
8	5	1 1 2 1	8'-10'	$\frac{2.0'}{1.3'}$	200	0.3' Black m-c SAND 0.6' Gray f SAND little silt 0.3' Black f-m SAND 0.1' Gray f-m SAND		
10	6	4 4 4 4	10'-12'	$\frac{2.0'}{1.5'}$	40-top 5-bottom	0.7' Gray f-m SAND 0.8' Gray-black (stained) m SAND odor, wet		
12	7	1 2 1 1	12'-14'	$\frac{2.0'}{1.5'}$	20	Gray vf SAND, little silt.		SB-2 12-14 TCL/TAL
14	8	1 2 2 3	14'-16'	$\frac{2.0'}{1.5'}$	5	1.0' Brown silty, CLAY, little v.f. sand, soft 0.5 D.O. - Gray		

NY-1

Project: Korkay Client: NYSDEC Well No: ASW-1

DRILLING SUMMARY

Drilling Co: SJB Services Drillers: J. Lamm
 Drill Rig Make/Model: CME 75
 Borehole Diameters: 8" Drilling Fluid: None
 Bits/Depths: 4 1/4" Hollow Stem Auger
 Total Depth: 12.1' b.g. Depth to Water: ± 8' b.g.
 Supervisory Geologist: R. Chenecko

WELL DESIGN

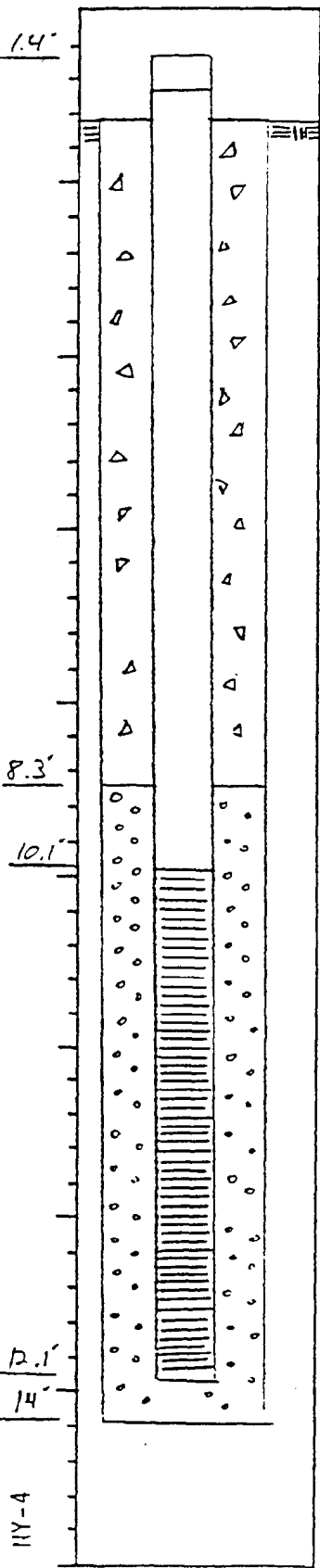
Casing Material: Sch 40 PVC Diameter: 2-inch Length: 11.5'
 Screen Material: Sch 40 PVC Diameter: 2-inch Length: 2.0'
 Slot Size: 10 slot Setting: 10.1' to 12.1' b.g.
 Filter Material: No. 0 Merie Setting: 8.3' to 14' b.g.
 Seals Material: NA Setting: NA
 Grout: Type I Cement / bentonite Setting: 0' to 8.3' b.g.
 Surface Casing Material: NA Setting: NA

TIME LOG

	Started	Completed
Drilling:	<u>10/5/94</u>	<u>10/5/94</u>
Installation:	<u>10/5/94</u>	<u>10/5/94</u>
Development:	<u>NA</u>	<u>NA</u>

WELL DEVELOPMENT

Method: NA
 Static Depth to Water: —
 Pumping Depth to Water: NA
 Pumping Rate: NA Specific Capacity: NA
 Volume Pumped: NA



WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: RM

TYPE OF FILTER PACK: _____

DRILLING CONTRACTOR: Parrott Well

GRADATION: _____

AMOUNT OF FILTER PACK USED: _____

DRILLING TECHNIQUE: Grout

TYPE OF BENTONITE: _____

SIZE AND TYPE: _____

AMOUNT OF BENTONITE: _____

BOREHOLE IDENTIFICATION: MW-17

TYPE OF CEMENT: _____

BOREHOLE DIAMETER: 4"

AMOUNT CEMENT USED: _____

WELL IDENTIFICATION: _____

GROUT MATERIALS USED: _____

WELL CONSTRUCTION START DATE: _____

9/14/15

WELL CONSTRUCTION COMPLETION DATE: _____

DIMENSIONS OF SECURITY CASING: 1"

SCREEN MATERIAL: PVC

TYPE OF WELL CAP: Flushmount

SCREEN DIAMETER: 2"

TYPE OF END CAP: J-plug

SCREENED INTERVAL (ft.): 5-15'

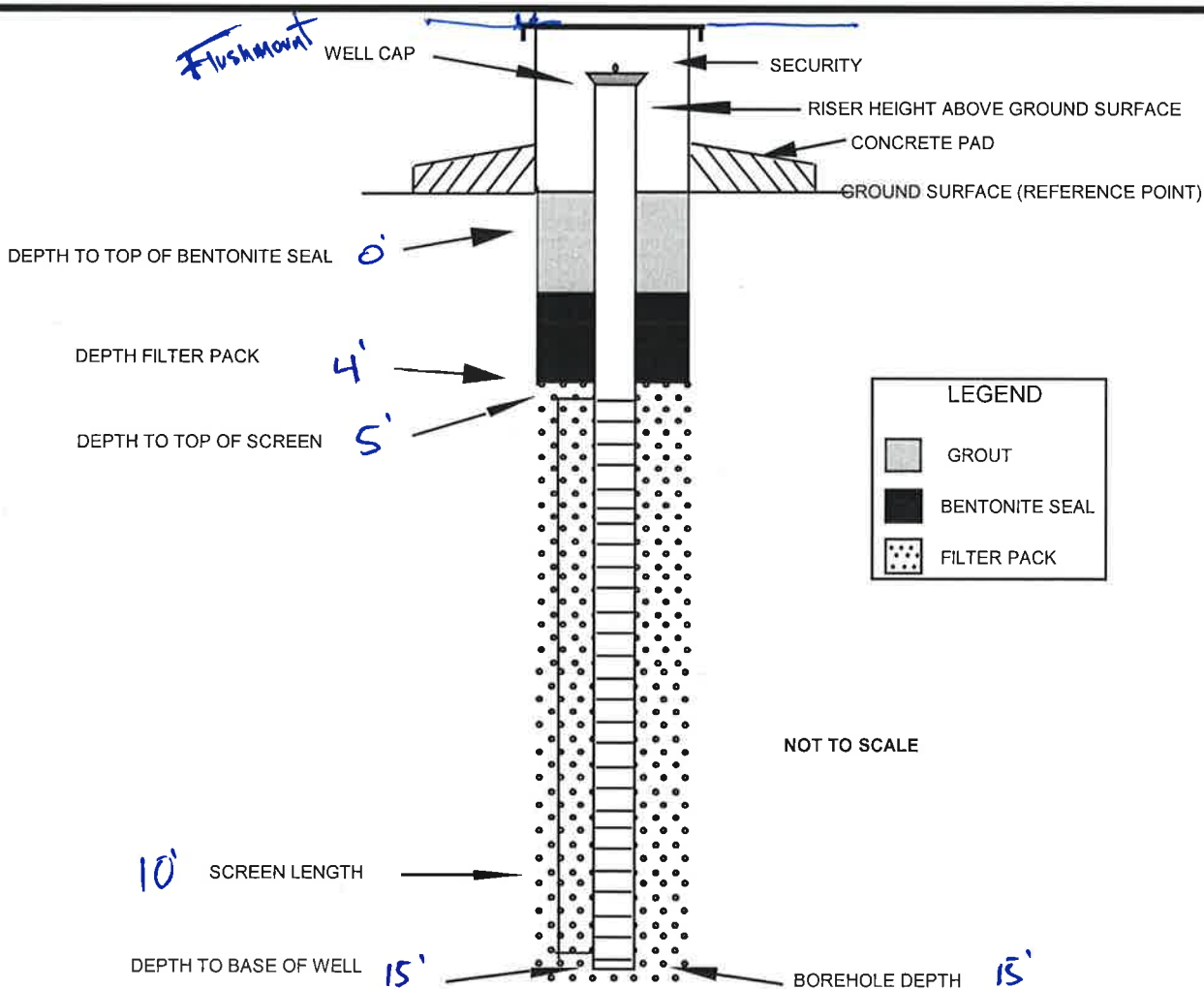
COMMENTS: _____

RISER MATERIAL: PVC

CASING MATERIAL: Metals

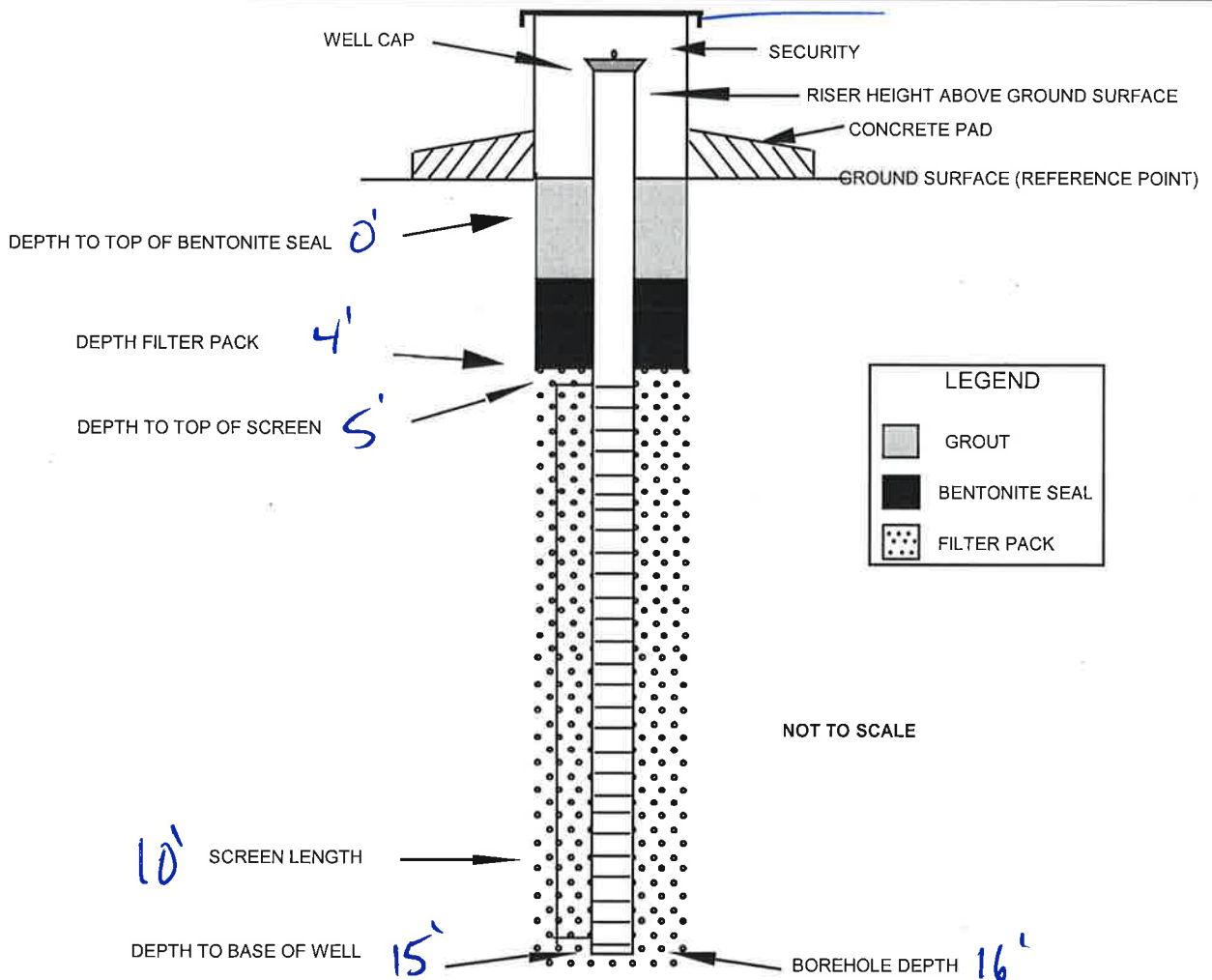
RISER DIAMETER: 2"

DEPTH OF CASING: _____



WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: <u>RM^{EC}</u> DRILLING CONTRACTOR: <u>Rennett Wolff</u> DRILLING TECHNIQUE: <u>Creeprobe</u> SIZE AND TYPE: _____ BOREHOLE IDENTIFICATION: <u>MW-18</u> BOREHOLE DIAMETER: <u>4"</u> WELL IDENTIFICATION: _____ WELL CONSTRUCTION START DATE: <u>9/14/16</u> WELL CONSTRUCTION COMPLETION DATE: <u>9/14/15</u> SCREEN MATERIAL: <u>Pvc</u> SCREEN DIAMETER: <u>2"</u> SCREENED INTERVAL (ft.): <u>5 - 15</u> RISER MATERIAL: <u>Pvc</u> RISER DIAMETER: <u>2"</u>	TYPE OF FILTER PACK: <u>Quartz</u> GRADATION: _____ AMOUNT OF FILTER PACK USED: <u>4 Bu. 11</u> TYPE OF BENTONITE: <u>Best Plug</u> AMOUNT OF BENTONITE: _____ TYPE OF CEMENT: <u>Portland</u> AMOUNT CEMENT USED: _____ GROUT MATERIALS USED: _____ DIMENSIONS OF SECURITY CASING: <u>1"</u> TYPE OF WELL CAP: <u>Flushmount</u> TYPE OF END CAP: <u>J-Plug</u> COMMENTS: _____ CASING MATERIAL: _____ DEPTH OF CASING: _____
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BOREHOLE LOG

BORING ID #: **MW-18**
 START DATE: **9/14/15** END DATE:

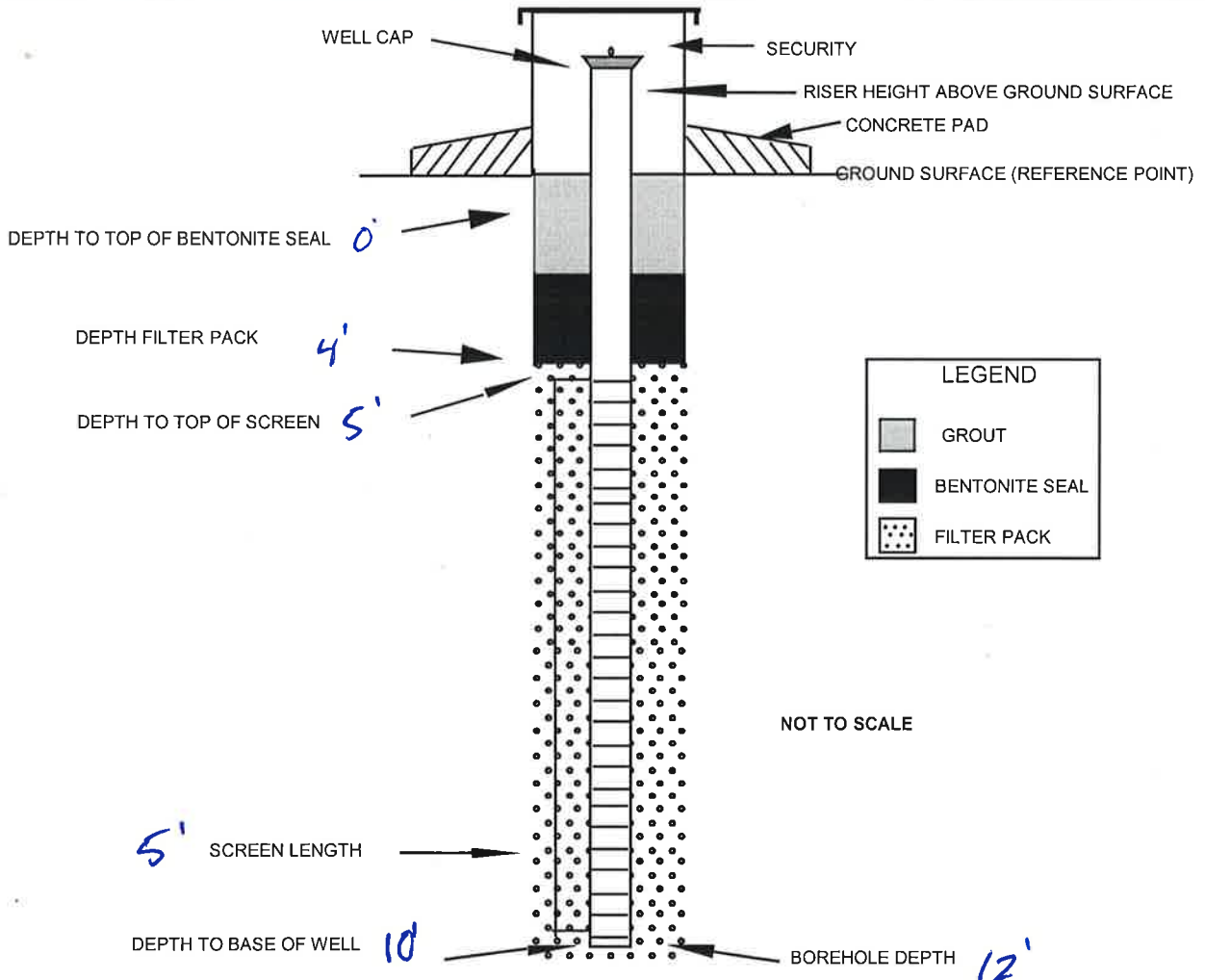
PROJECT NAME: **Korkay** PROJECT NO.: **60273289** PROJECT MANAGER: **Walter Howard**
 SITE LOCATION: **Broadalbin, NY** BORING LOCATION:
 DRILLING CO.: **Parrott Wolf** DRILLER:
 BOREHOLE DIAMETER: **2"** DEPTH TO BEDROCK: **N/A** DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH REACHED: INSPECTOR: **Ross M** TOTAL DEPTH DRILLED:
 LATITUDE: LONGITUDE: WEATHER CONDITIONS: **cloudy, windy 60°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)			DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE			CASING	TUBE	CORE
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0				N	N	N						
4	2.6	0										
8	4	0		N	N	N						
12	4'		12 ppm 275 ppm	Y	N	N						▽ 10-11
16	4'		115 ppm 400 ppb	N	N	N						
20												

0-1: D. BR FMC SAND; DRY
 1-2: L BR FMC SAND; trace FM GRAVEL
 2-2.5: DRK BR FMC SAND; dry
 4-8: L. BR FMC SAND; moist; no odors
 8-11: C⁴⁵ MF SAND; GRAY; wet; odor
 11-12: BR FM SAND; saturated; no odor
 12-13: SAA
 13-14: BR F SAND; compact; wet
 14-15: L BR SILT & CLAY; compact; high plasticity
 15.5-16: BR FM SAND
 Set Screen 5'-15'

WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: <u>RM Eady</u> DRILLING CONTRACTOR: <u>Parratt Wolff</u> DRILLING TECHNIQUE: <u>Geoprobe</u> SIZE AND TYPE: _____ BOREHOLE IDENTIFICATION: <u>MW-19</u> BOREHOLE DIAMETER: <u>4"</u> WELL IDENTIFICATION: <u>MW-19</u>	TYPE OF FILTER PACK: <u>Quartz</u> GRADATION: _____ AMOUNT OF FILTER PACK USED: _____ TYPE OF BENTONITE: <u>Best Plug</u> AMOUNT OF BENTONITE: _____ TYPE OF CEMENT: <u>Portland</u> AMOUNT CEMENT USED: _____ GROUT MATERIALS USED: _____
WELL CONSTRUCTION START DATE: _____ WELL CONSTRUCTION COMPLETION DATE: <u>9/15/15</u> SCREEN MATERIAL: <u>PVC</u> SCREEN DIAMETER: <u>2"</u> SCREENED INTERVAL (ft.): <u>5-10'</u>	DIMENSIONS OF SECURITY CASING: <u>1"</u> TYPE OF WELL CAP: <u>Flushmount</u> TYPE OF END CAP: <u>± plus</u> COMMENTS: <u>Flushmount in driveway</u>
RISER MATERIAL: <u>PVC</u> RISER DIAMETER: <u>2"</u>	CASING MATERIAL: <u>steel</u> DEPTH OF CASING: <u>1"</u>





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BOREHOLE LOG

BORING ID #: **MW-19**
 START DATE: **9/15/15** END DATE:

PROJECT NAME: **Korkay**
 SITE LOCATION: **Broadalbin, NY**
 DRILLING CO.: **Parrott Wolf**
 BOREHOLE DIAMETER: **4"**
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273289**
 BORING LOCATION: **Fantasy wet Down Street 8**
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR: **Ross M**
 LONGITUDE:

PROJECT MANAGER: **Walter Howard**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny, 60° 8:30 am**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1: DATE 2:	DEPTH 1: DEPTH 2:	TIME 1: TIME 2:	
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUC	FALL			CASING	TUBE	CORE	RIG TYPE:	
							TYPE							
							GEOLOGIC DESCRIPTION				LITHOLOGY/ SOIL TYPE	WATER LEVEL		
0.0				N	N	N	0-0.5: Concrete overburden 0.5-1.2: DR BROWN FM SAND; FM Gravel; dry 1.2-3.2: L. BROWN F ⁽⁺⁾ M SAND; dry No odors							
4	3.2	0		N	N	N	4-7: SAA; wet @ 5' 7-8: L. BR CLAYEY SILT; high plasticity							▽5'
8	4	0		N	N	N	8-9: L. BR FM SAND; wet 9-10: L. BR CLAYEY SILT; high plasticity 10-10.5: L. BR FM SAND 10.5-11: L. BR CLAYEY SILT 11-12: L. BR FM SAND; wet							
12							Set Screen from 5-10' Sand to 4'							
16														
20														

Sw204'
5-10'
Screen

WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: RM Eady

TYPE OF FILTER PACK: Quartz

DRILLING CONTRACTOR: Peratt well

GRADATION: _____
 AMOUNT OF FILTER PACK USED: 6 Bags

DRILLING TECHNIQUE: Geoprobe
 SIZE AND TYPE: _____

TYPE OF BENTONITE: Enviroplug
 AMOUNT OF BENTONITE: _____

BOREHOLE IDENTIFICATION: MW-20

TYPE OF CEMENT: Portland

BOREHOLE DIAMETER: 4"

AMOUNT CEMENT USED: _____

WELL IDENTIFICATION: Corner of Main & 2nd

GROUT MATERIALS USED: _____

WELL CONSTRUCTION START DATE: 9/15/15

WELL CONSTRUCTION COMPLETION DATE: 9/15/15

DIMENSIONS OF SECURITY CASING: 1"

SCREEN MATERIAL: PVC

TYPE OF WELL CAP: Flush mount

SCREEN DIAMETER: 2"

TYPE OF END CAP: J-plug

SCREENED INTERVAL (ft.): 4-14

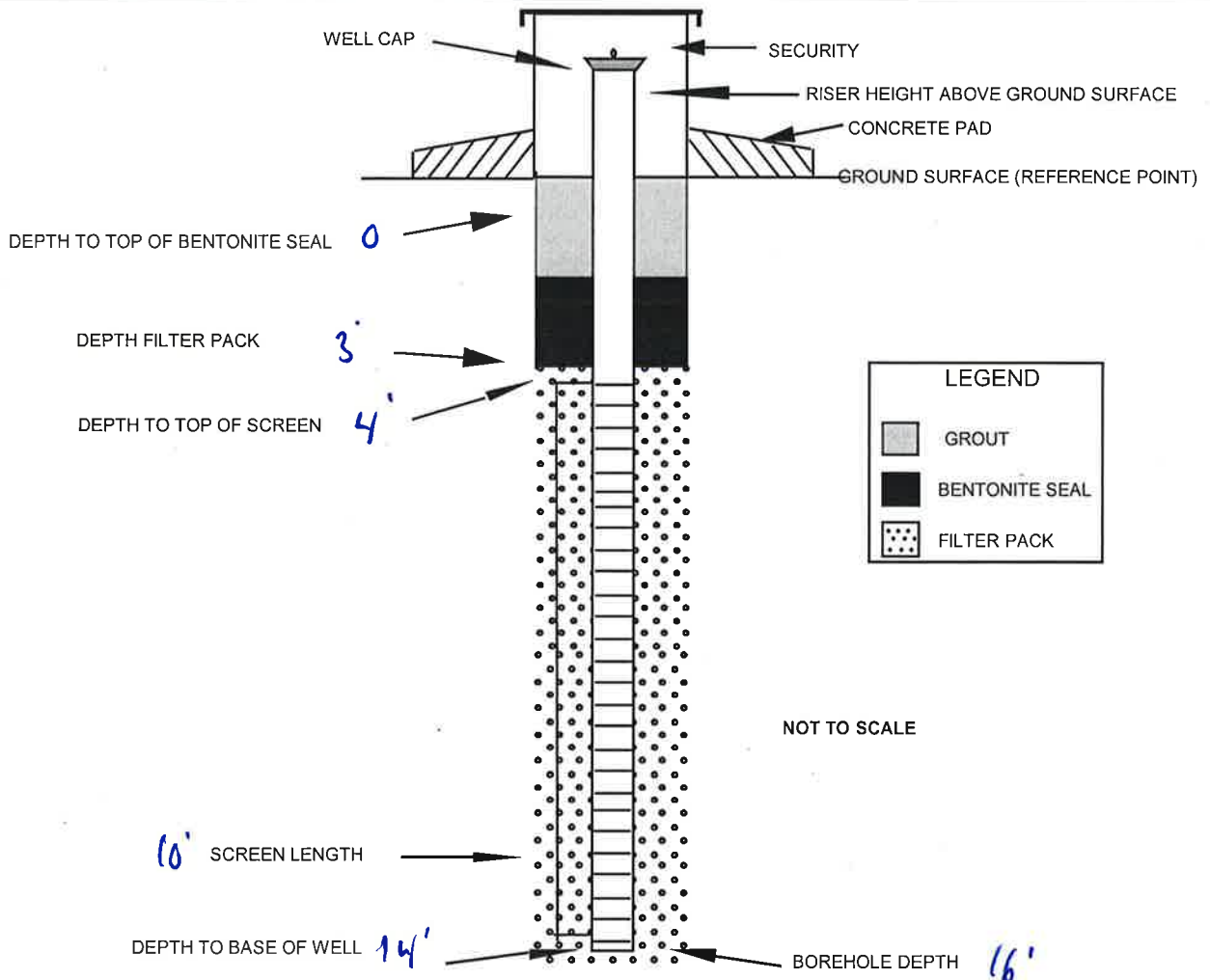
COMMENTS: leaking

RISER MATERIAL: PVC

CASING MATERIAL: steel

RISER DIAMETER: 2"

DEPTH OF CASING: _____





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BOREHOLE LOG

BORING ID #: **MW-20**

START DATE: **9/15/15** END DATE: **9/15/15**

PROJECT NAME: **Korkay**
 SITE LOCATION: **Broadalbin, NY**
 DRILLING CO.: **Parrott Wolf**
 BOREHOLE DIAMETER: **4"**
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273289**
 BORING LOCATION: **Corner of Main & 2nd Ave**
 DRILLER:
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **Ross McEneaney**
 LONGITUDE:

PROJECT MANAGER: **Walter Howard**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny, 70° 11:00 am**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:	
DEPTH (feet bgs)	Blow Count	RECOVERY	PID	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:	
							FALL TYPE	ID/OD	DATE 2:	DEPTH 2:	TIME 2:		
0.0													
4	3			N	N	N							
							GEOLOGIC DESCRIPTION					LITHOLOGY/ SOIL TYPE	WATER LEVEL
							0-1.5: concrete overburden 1.5-4: L. BR F ⁺ M SAND; DRY						
8	4		1770	N	N	N	4-6.5: SAA 6.5-8: L. Brown FM SAND; wet						~6.5'
12	4			N	N	N	8-11.5: SAA 11.5-12: L. BR CLAYEY-SILT; High Plasticity						
16	4			N	N	N	12-14: BR FM SAND; wet; Sappy 14-16: GR/BR SILTY-CLAY Set Screen 4-14'						
20													

~~Screen 7-12~~

Screen 4-14

7

WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: R M Cuddy

TYPE OF FILTER PACK: Quartz

DRILLING CONTRACTOR: Parrott Well

GRADATION: _____
 AMOUNT OF FILTER PACK USED: 6 Bags

DRILLING TECHNIQUE: Geoprobe
 SIZE AND TYPE: 6720DT

TYPE OF BENTONITE: Enviroplug
 AMOUNT OF BENTONITE: _____

BOREHOLE IDENTIFICATION: MW-21

TYPE OF CEMENT: Portland

BOREHOLE DIAMETER: 2"

AMOUNT CEMENT USED: _____

WELL IDENTIFICATION: MW-21 7' w. Main

GROUT MATERIALS USED: _____

WELL CONSTRUCTION START DATE: 7/15/15

DIMENSIONS OF SECURITY CASING: 1 Foot

WELL CONSTRUCTION COMPLETION DATE: 7/15/15

SCREEN MATERIAL: PVC

TYPE OF WELL CAP: Flushmount / R Box

SCREEN DIAMETER: 2"

TYPE OF END CAP: J-Plug

SCREENED INTERVAL (ft.): 7-12'

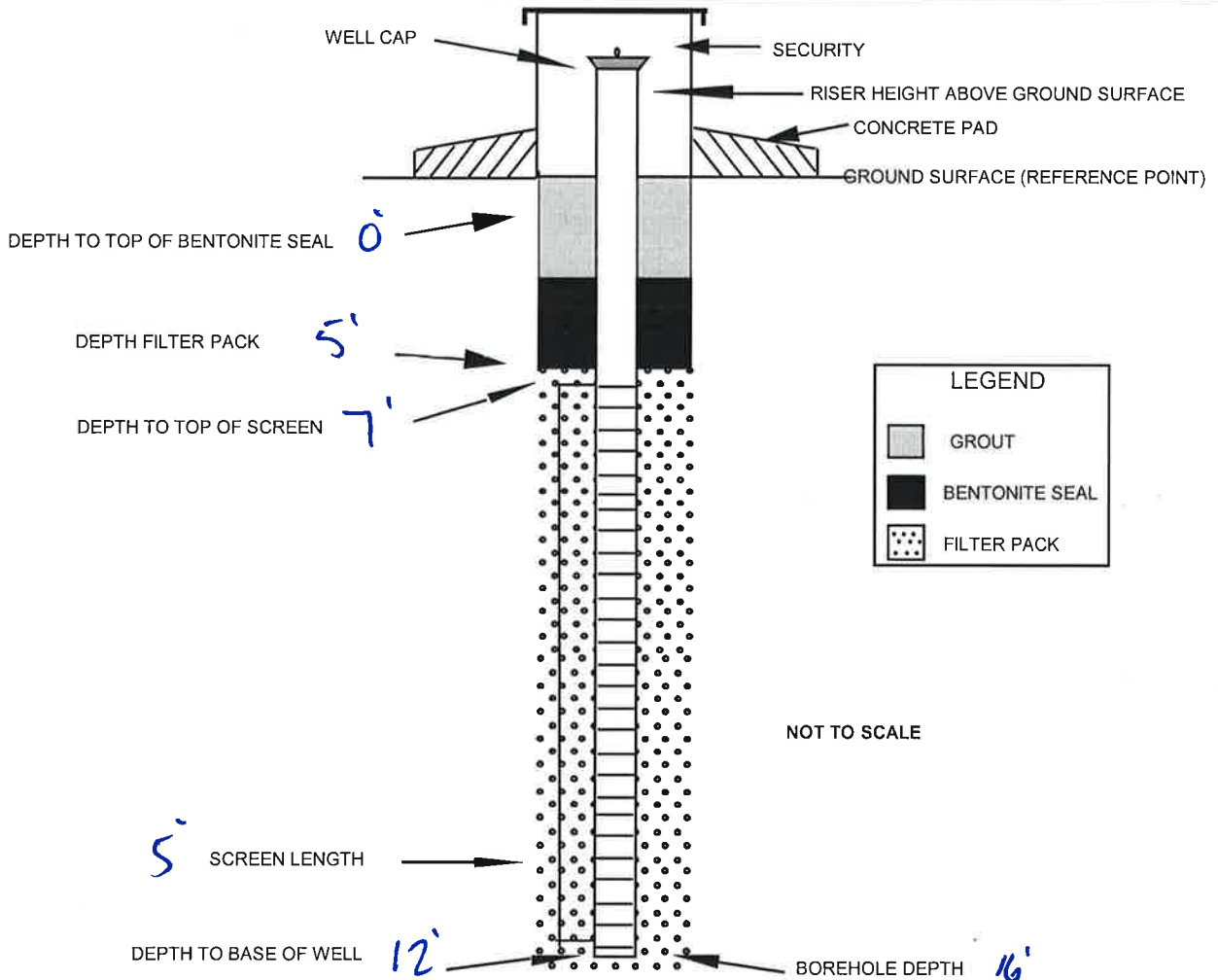
COMMENTS: _____

RISER MATERIAL: PVC

CASING MATERIAL: Steel

RISER DIAMETER: 2"

DEPTH OF CASING: _____





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BOREHOLE LOG

BORING ID #: **MW-21**

START DATE: **9/15/15** END DATE:

PROJECT NAME: **Korkay**
 SITE LOCATION: **Broadalbin, NY**
 DRILLING CO.: **Parrott Wolff**
 BOREHOLE DIAMETER: **4"**
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273289**
 BORING LOCATION: **73 N. Main Street**
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR: **Ross M**
 LONGITUDE:

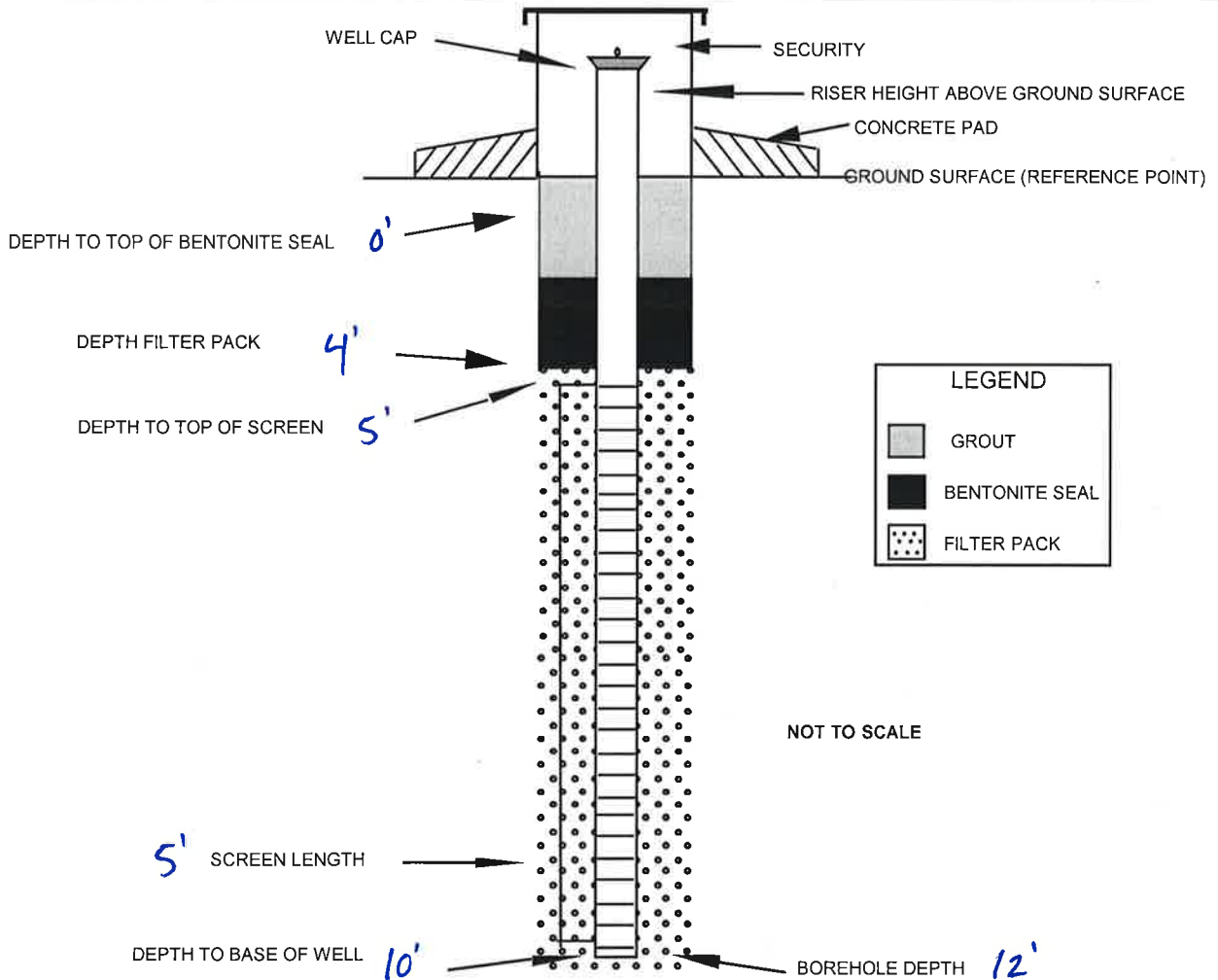
PROJECT MANAGER: **Walter Howard**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny, 75°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1: DATE 2:	DEPTH 1: DEPTH 2:	TIME 1: TIME 2:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	FALL TYPE	ID/OD	CASING	TUBE	CORE	RIG TYPE:	
GEOLOGIC DESCRIPTION												LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0													
4'	3		0	N	N	N							
8'	4		0	N	N	N							
12'	4		10 ppm 32 ppm										79'
16'	4		0	N	N	N							
20'													

Sand to 5'
 Screen
 7'-12'

WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: <u>M=ca y</u> DRILLING CONTRACTOR: <u>Parratt Wolff</u> DRILLING TECHNIQUE: <u>Coopade</u> SIZE AND TYPE: _____ BOREHOLE IDENTIFICATION: <u>MW-22</u> BOREHOLE DIAMETER: <u>2"</u> WELL IDENTIFICATION: _____ WELL CONSTRUCTION START DATE: <u>9/16/15</u> WELL CONSTRUCTION COMPLETION DATE: <u>9/16/15</u> SCREEN MATERIAL: <u>PVC</u> SCREEN DIAMETER: <u>2"</u> SCREENED INTERVAL (ft.): <u>5'-10'</u> RISER MATERIAL: <u>PVC</u> RISER DIAMETER: <u>2"</u>	TYPE OF FILTER PACK: <u>Quartz</u> GRADATION: _____ AMOUNT OF FILTER PACK USED: <u>6 Bags</u> TYPE OF BENTONITE: <u>Enviroplug</u> AMOUNT OF BENTONITE: _____ TYPE OF CEMENT: <u>Portland</u> AMOUNT CEMENT USED: <u>2 Bags</u> GROUT MATERIALS USED: _____ DIMENSIONS OF SECURITY CASING: <u>1'</u> TYPE OF WELL CAP: <u>Roadbox</u> TYPE OF END CAP: <u>J-plug</u> COMMENTS: _____ CASING MATERIAL: <u>steel</u> DEPTH OF CASING: _____
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BOREHOLE LOG

BORING ID #: **MW-22**
 START DATE: **9/16/15** END DATE:

PROJECT NAME: **Korkay** PROJECT NO.: **60273289** PROJECT MANAGER: **Walter Howard**
 SITE LOCATION: **Broadalbin, NY** BORING LOCATION: **Back right area of site** DRILLING METHOD: **Geoprobe**
 DRILLING CO.: **Parrott Wolf** DRILLER: DRILLING METHOD: **Geoprobe**
 BOREHOLE DIAMETER: **4 1/2"** DEPTH TO BEDROCK: **w/a** INSPECTOR: **Ross M**
 TOTAL DEPTH REACHED: WEATHER CONDITIONS: **Sunny, 60° 8:30 am**
 LATITUDE: LONGITUDE: ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUC	WEIGHT(S)		CASING	DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE		TUBE	CORE	RIG TYPE:	
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0			0	N	N	N						
4	3											
8	4		123 ppm 44 ppm 281 ppm									
12	4		157 ppm 97 ppm 1200 ppb									
16												
20												

0-1: Organic overburden
 1-3: L BR FMC SAND; dry; loose

4-5.5: SAA
 5.5-6.5: GR. FMC SAND; moist; odor
 6.5-7.5: BR F⁽⁺⁾M SAND; wet; no odor
 7.5-8: BLACK FM SAND; wet; odor

8-9: SAA
 9-10.5: BR F⁽⁺⁾M SAND; wet; loose;
 Some odor
 10.5-12: BR SILT & CLAY; firm;
 high plasticity

Set screen 5'-10'
 Sand up to 4'

W ~ 6.5'

WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: M. Kredy

TYPE OF FILTER PACK: Quartz

DRILLING CONTRACTOR: Perritt Well

GRADATION: _____
AMOUNT OF FILTER PACK USED: 6

DRILLING TECHNIQUE: Geoprobe
SIZE AND TYPE: _____

TYPE OF BENTONITE: Enviroplug
AMOUNT OF BENTONITE: _____

BOREHOLE IDENTIFICATION: MW-23

TYPE OF CEMENT: Portland

BOREHOLE DIAMETER: 4"

AMOUNT CEMENT USED: _____

WELL IDENTIFICATION: _____

GROUT MATERIALS USED: _____

WELL CONSTRUCTION START DATE: 9/16/15

WELL CONSTRUCTION COMPLETION DATE: 9/16/15

DIMENSIONS OF SECURITY CASING: 1'

SCREEN MATERIAL: PVC

TYPE OF WELL CAP: Roadbox

SCREEN DIAMETER: 2"

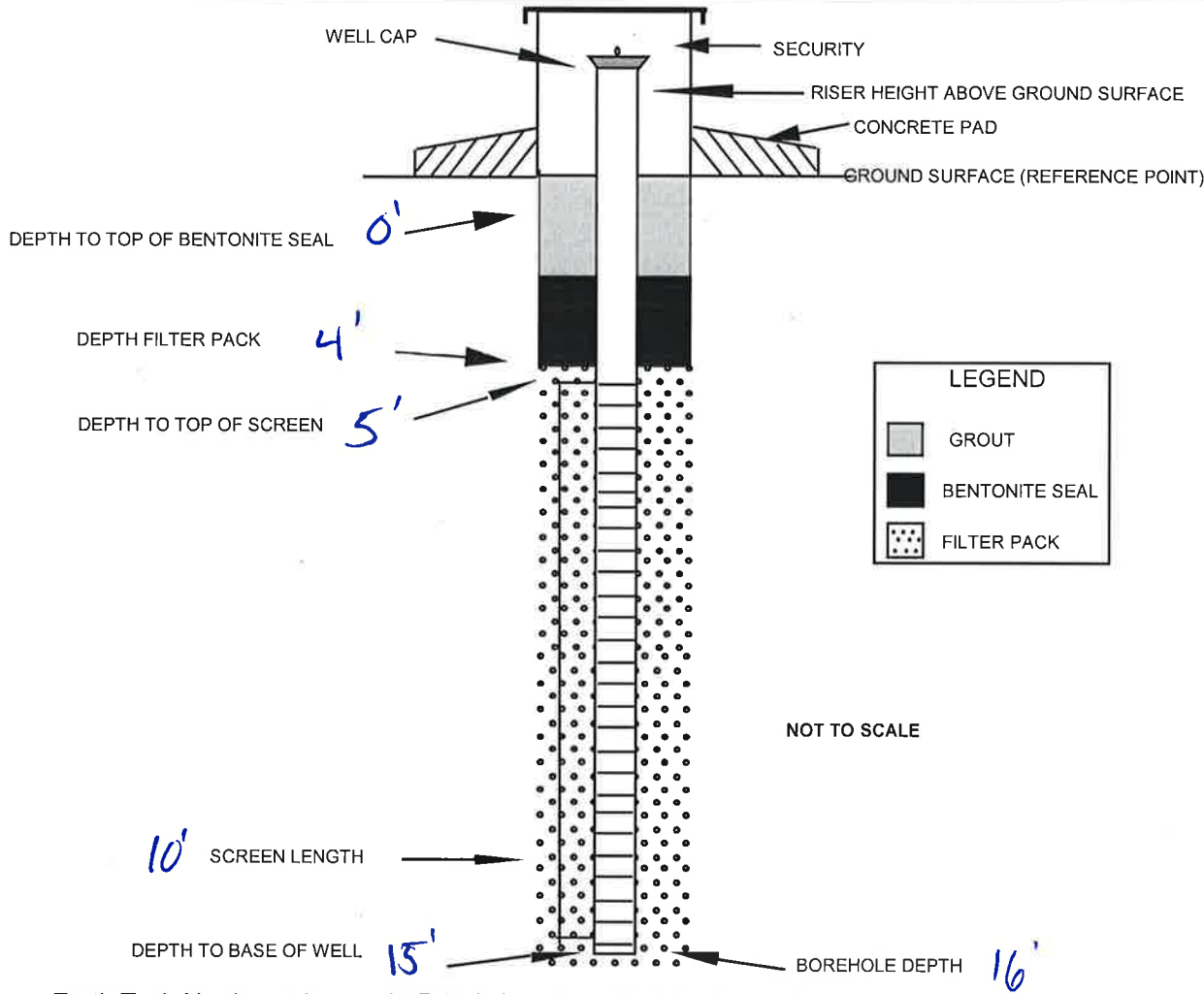
TYPE OF END CAP: J-plug

SCREENED INTERVAL (ft.): 5-15'

COMMENTS: Flushmount

RISER MATERIAL: PVC
RISER DIAMETER: 2"

CASING MATERIAL: Steel
DEPTH OF CASING: 6"



WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: M. Eredy

TYPE OF FILTER PACK: Quartz

DRILLING CONTRACTOR: Parrott Wolff

GRADATION: _____
AMOUNT OF FILTER PACK USED: 5

DRILLING TECHNIQUE: Geoprobe
SIZE AND TYPE: _____

TYPE OF BENTONITE: Enviroplug
AMOUNT OF BENTONITE: _____

BOREHOLE IDENTIFICATION: MW-24

TYPE OF CEMENT: Portland

BOREHOLE DIAMETER: 2 1/4"

AMOUNT CEMENT USED: _____

WELL IDENTIFICATION: _____

GROUT MATERIALS USED: _____

WELL CONSTRUCTION START DATE: 9/16/15

WELL CONSTRUCTION COMPLETION DATE: 9/16/15

DIMENSIONS OF SECURITY CASING: 1'

SCREEN MATERIAL: PVC

TYPE OF WELL CAP: Roadbox

SCREEN DIAMETER: 2"

TYPE OF END CAP: J-plug

SCREENED INTERVAL (ft.): 7'-12'

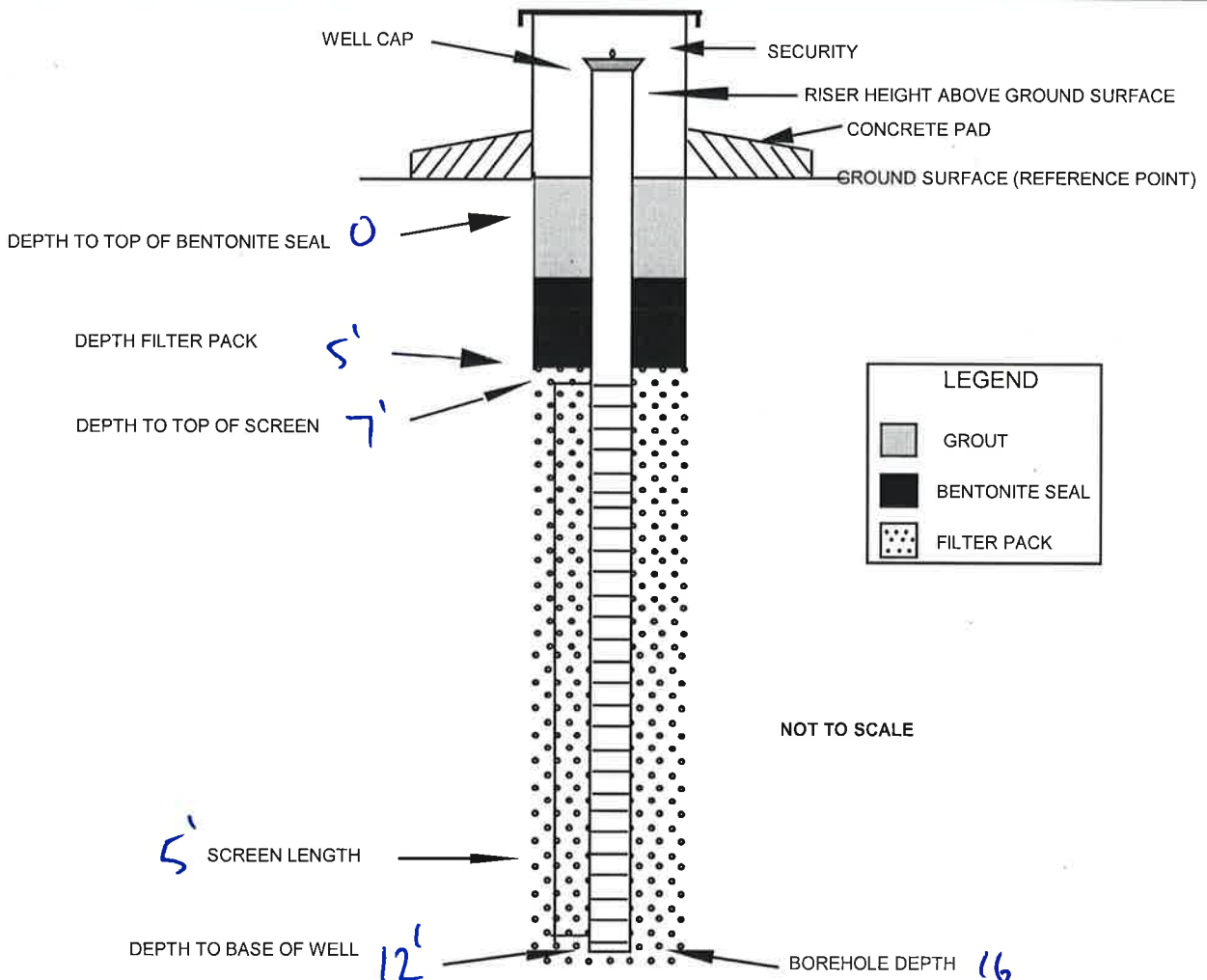
COMMENTS: _____

RISER MATERIAL: PVC

CASING MATERIAL: Steel

RISER DIAMETER: 2"

DEPTH OF CASING: _____



8x20-160
 8 check valves
 YSI
 Turb meter



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BOREHOLE LOG

BORING ID #: **MW-24**

START DATE: **9/16/15** END DATE:

PROJECT NAME: Korkay PROJECT NO.: 60273289 PROJECT MANAGER: Walter Howard
 SITE LOCATION: Broadalbin, NY BORING LOCATION: **Behind house on W. Main Street**
 DRILLING CO.: Parrott Wolf DRILLER: DRILLING METHOD: **Gasprobe**
 BOREHOLE DIAMETER: **4 1/2"** DEPTH TO BEDROCK: TOTAL DEPTH DRILLED:
 TOTAL DEPTH REACHED: INSPECTOR: Ross M WEATHER CONDITIONS: **Sunny, 75°**
 LATITUDE: LONGITUDE: ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)			DATE 2:	DEPTH 2:	TIME 2:
							FALL		CASING	TUBE	CORE	RIG TYPE:
							TYPE					
							ID/OD					
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0												
4'		0'	0	N	N	N						
8'		4'	0	N	N	N						
12'		4'	0	N	N	N						0-9'
16'		4'	0	N	N	N						
20'												

Set
 8x7-12
 screen

Set screen 7-12'
 Sand up to 5'



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BOREHOLE LOG

BORING ID #: **GW-II**

START DATE: **7/7/14** END DATE: **7/7/14**

PROJECT NAME: **Korkay**
 SITE LOCATION: **Bradshin, WV**
 DRILLING CO.: **Parat Wolf**
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273206**
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR:
 LONGITUDE:

PROJECT MANAGER:
 DRILLING METHOD:
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS:
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	FALL		CASING	TUBE	DATE 2:	DEPTH 2:	RIG TYPE:
							TYPE						
ID/OD							GEOLOGIC DESCRIPTION					LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0			HS=0				0-1: Topsoil (Hand-Clean) 1-3: L. Brown FMC SAND, dry					Dry	
2.0													
4.0			2.5 HS=0										
6.0							4-6.5: L. Brown CMF SAND, modified @ 5'					NH/Loss	
8.0			HS HS=				7.5-9.5: SAA 7.5-9.8: Dark gray → Black SILT and SAND, Top inch greenish 9.8-12: Brown fine SANDY SILT w/ Trace clay						
10.0			0.1				* Collected GW-II @ 13:18 Set Screen 8-12'						
12.0													
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: *GW-12*

START DATE: *7/7/14* END DATE:

PROJECT NAME: *Korkay*
 SITE LOCATION:
 DRILLING CO.: *PW*
 BOREHOLE DIAMETER: *3"*
 TOTAL DEPTH REACHED: *12'*
 LATITUDE:

PROJECT NO.: *G0773286*
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK: *N/A*
 INSPECTOR: *Bsm*
 LONGITUDE:

PROJECT MANAGER: *Santacrose*
 DRILLING METHOD: *Gasprobe*
 TOTAL DEPTH DRILLED: *12'*
 WEATHER CONDITIONS: *Sunny/80°*
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE ID/OD		TUBE	CORE	RIG TYPE:	
GEOLOGIC DESCRIPTION										LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0			<i>Hs: 0</i>									
	<i>2.7</i>											
2.0												
4.0			<i>Hs: 0</i>									
	<i>3'</i>											
6.0												
			<i>72</i>									
8.0			<i>Hs: 70</i>									
10.0												
12.0			<i>x</i>									
14.0												
16.0												
18.0												
20.0												

*0-6: Top Soil / Overburden
 6-2': Dark Brown FM SAND*

2-2.7: L. Brown FMC SAND

*4-5.5: SAA
 5.5-6.0: 6 Gray / Brown Fine SAND*

6-7: Dark Gray MF SAND, no odor

*8-12: ~~No Recovery~~
 6" recovered stained silty sand wet gray*

Set Screen from 6'-10'

** collected GW-12 @ 15:00*



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BOREHOLE LOG

BORING ID #: **GW-13**

START DATE: **7/7/14** END DATE: **7/7/14**

PROJECT NAME: **Korkay**
 SITE LOCATION: **Boulder/lin**
 DRILLING CO.: **PW**
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60278286**
 BORING LOCATION: **Near camera garage**
 DRILLER:
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **Bsm**
 LONGITUDE:

PROJECT MANAGER:
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS:
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUC	WEIGHT(S)		CASING	DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE		TUBE	CORE	RIG TYPE:	
							GEOLOGIC DESCRIPTION				LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0												
	2.8		0m									
2.0												
4.0												
	2.5		1.4									
6.0												
8.0												
	3		1.4									
10.0			1450									
12.0												
14.0												
16.0												
18.0												
20.0												

0-1.5: Top Soil & overburden
1.5-2.8: Brown FMC SAND, moist no odor

Dry/Loss

4-5.5: SAA
5.5-6.5: Black/Grey Fine SAND, odor

moist/loss

8-8.5: SAA, more wet
8.5-11: Brown Fine SAND w/ SILT, wet

wet/loss

*** Collected GW-13 @ 16:00**
Set Screen 8'-12'



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BOREHOLE LOG

BORING ID #: **GW-14**
 START DATE: **7/7** END DATE: **7/7**

PROJECT NAME: **Korkay**
 SITE LOCATION: **Brooklyn**
 DRILLING CO.: **PW**
 BOREHOLE DIAMETER: **5"**
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **0208206**
 BORING LOCATION:
 DRILLER: **PW**
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **RSM**
 LONGITUDE:

PROJECT MANAGER: **Santucci**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny, 80°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	FALL		CASING	TUBE	CORE	RIG TYPE:	
							TYPE						
ID/OD							GEOLOGIC DESCRIPTION					WATER LEVEL	
0.0		1.5	0				0-1: Topsoil Overburden 1-1.5: Orangeish-Brown FCM SAND					Dry/Look	
2.0													
4.0		2.5	7.5				4-5: SAA, more Brown 5-5.75: Grayish fine SAND, odor, 5.75-6.5: Black fine SAND, odor					moist Wet	
6.0													
8.0		0	1415				8-12: No Recovery, Shoe showed similar material to GW-13						
10.0													
12.0							* Collected GW-14 @ 16:30						
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: **GW-15**

START DATE: **7/8** END DATE: **7/8**

PROJECT NAME: **Korkay**
 SITE LOCATION: **Broadalbin**
 DRILLING CO.: **DW**
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.:
 BORING LOCATION: **Back Section near pool**
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR:
 LONGITUDE:

PROJECT MANAGER:
 DRILLING METHOD:
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS:
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE ID/OD		TUBE	CORE	RIG TYPE:	
GEOLOGIC DESCRIPTION										LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0												
			32	00								
2.0												
4.0												
			3	755								
6.0												
8.0												
			4	12								
10.0												
12.0												
14.0												
16.0												
18.0												
20.0												

* clogged GW-15 @ 7:45
 set screen @ 8-12'



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BOREHOLE LOG

BORING ID #: **Gw-IG**

START DATE: END DATE:

PROJECT NAME:	PROJECT NO.:	PROJECT MANAGER:
SITE LOCATION:	BORING LOCATION:	
DRILLING CO.:	DRILLER:	DRILLING METHOD:
BOREHOLE DIAMETER:	DEPTH TO BEDROCK:	TOTAL DEPTH DRILLED:
TOTAL DEPTH REACHED:	INSPECTOR:	WEATHER CONDITIONS:
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE ID/OD		TUBE	CORE	RIG TYPE:	
0.0		1' 0										
2.0												
4.0		0 1.2										
6.0												
8.0		4' 6.7										
10.0												
12.0												
14.0												
16.0												
18.0												
20.0												

0-1: Overburden / Topsoil

4-8: No Recovery

8-8.8: Black fine SAND, color
 8.8-10.7: Brown fine SAND w/ silt
 10.7-12: Brown Clayey-SILT

wet / fine

* Collected Gw-IG @ 8:10
 sat Screen 8-12'



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BOREHOLE LOG

BORING ID #: *GW-57*
 START DATE: *7/8/14* END DATE:

PROJECT NAME: *Korkay*
 SITE LOCATION:
 DRILLING CO.:
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.:
 BORING LOCATION: *2nd row from back, in center*
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR:
 LONGITUDE:

PROJECT MANAGER:
 DRILLING METHOD:
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS:
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE		TUBE	CORE	RIG TYPE:	
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0		<i>2'</i>	<i>0</i>									
2.0												
4.0		<i>2.8</i>	<i>3.6</i> <i>691</i>									
6.0												
8.0			<i>1227</i>									
10.0		<i>3.5</i>	<i>126</i>									
12.0												
14.0												
16.0												
18.0												
20.0												

** Collected GW-57 @ 8:40
 + Collected DVP-1
 Set Screen @ 8:12'*



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BOREHOLE LOG

BORING ID #: *GW-18*

START DATE: *7/8/14* END DATE:

PROJECT NAME: *Kortay*
 SITE LOCATION:
 DRILLING CO.:
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.:
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR:
 LONGITUDE:

PROJECT MANAGER:
 DRILLING METHOD:
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: *cloudy, 80°*
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1: DATE 2:	DEPTH 1: DEPTH 2:	TIME 1: TIME 2:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	FALL		CASING	TUBE	CORE	RIG TYPE:	
							TYPE						
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0			0				<i>0-2.5: Topsoil/Organic matter</i>					<i>Dry</i>	
2.0		<i>25</i>											
4.0			<i>0.7 28.9</i>				<i>4-5.5: L. Brown FMC SAND 5.5-L. Brown/grayish FMC SAND</i>					<i>moist</i>	
6.0													
8.0			<i>678 20.0</i>				<i>8-9.2: Gray/Brown FM SAND, slight odor 9.2-11: Gray/Brown SILTY SAND, wet</i>					<i>wet</i>	
10.0							<i>* Collected GW-18 @ 9:00 Screen B-12</i>						
12.0													
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: **GW-19**
 START DATE: **7/8** END DATE: **7/8**

PROJECT NAME: **Kokey**
 SITE LOCATION: **Brooklyn NY**
 DRILLING CO.: **PW**
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273286**
 BORING LOCATION: **New fence @ Church**
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR:
 LONGITUDE:

PROJECT MANAGER: **J. Santoro**
 DRILLING METHOD: **Auger**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Cloudy**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION						HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUC	WEIGHT(S)	DATE 2:	DEPTH 2:	TIME 2:	
							FALL TYPE ID/OD	CASING	TUBE	CORE	RIG TYPE:
GEOLOGIC DESCRIPTION									LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0		2'	0								
2.0											
4.0		3'	00								
6.0											
8.0		4'	00								
10.0											
12.0		4'	0								
14.0											
16.0											
18.0											
20.0											

0-1: Organic Topsoil w/ gravel
 1-2: L. Brown FMC SAND w/ Trace gravel

4-7: L. Brown FMC SAND

8-12: L. Brown FM SAND, wet

12-13: SAA
 13-16: L. Brown fine CLAYEY-SILT
 - High plasticity

* Collected GW-19 @ 10:00
 * Collected MS/MSD
 Set Screen ~~10.5~~ 7.5-11.5'



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BOREHOLE LOG

BORING ID #: **GW-I10**

START DATE: **7/8** END DATE: **7/8**

PROJECT NAME: **Korka v**
 SITE LOCATION: **Bw**
 DRILLING CO.:
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.:
 BORING LOCATION: **on Harris Property near pool**
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR:
 LONGITUDE:

PROJECT MANAGER:
 DRILLING METHOD:
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS:
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	FALL		CASING	TUBE	DATE 2:	DEPTH 2:	TIME 2:
							TYPE						
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0			0				0-.6: Topsoil 6-.25: L. Brown FMC SAND, moist					moist/loam	
2.0	25												
4.0	3		714				4-.5: SAA 5-.75: Black FM SAND, odor					wet/moist wet/moist	
6.0													
8.0			4.1				8-.9.5: Brown SILTY-SAND, no odor 9.5-12: CLAYEY-SILT, Brown					wet wet/firm	
10.0													
12.0							* collected GW-I10 @ 10:45 Set screen 4'-8'						
14.0													
16.0													
18.0													
20.0													

Added Dec



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BOREHOLE LOG

BORING ID #: **GW-111**

START DATE: **7/8/14** END DATE: **7/8/14**

PROJECT NAME: Korkay	PROJECT NO.:	PROJECT MANAGER:
SITE LOCATION:	BORING LOCATION:	DRILLING METHOD:
DRILLING CO.:	DRILLER:	TOTAL DEPTH DRILLED:
BOREHOLE DIAMETER:	DEPTH TO BEDROCK:	WEATHER CONDITIONS:
TOTAL DEPTH REACHED:	INSPECTOR:	ELEVATION AND DATUM:
LATITUDE:	LONGITUDE:	

FIELD SAMPLE INFORMATION						WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:	
DEPTH (feet bgs) -	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUC	FALL		CASING	TUBE	CORE	RIG TYPE:	
							TYPE						
ID/OD													
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0		2'	0				0-1: Organic Black Topsoil 1-2: L → D Brown FMC SAND, Dry					Dry	
2.0													
4.0		3'	0				4-5.8: SAA, Wet 5.8-6.1: Brown fine SILT w/ SAND (Confining) 6.1-7: Black FM SAND						
6.0													
8.0		4'	35.7 1.4				8-10.5: Brown fine SILT w/ SAND 10.5-12: L. Brown CLAYEY-SILT					wet/firm	
10.0							* collected GW-111 @ 11:00 * collected Soil Sample (S1-111) @ 11:00						
12.0							- Sat Screen 10 ' 5'-9'						
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: **GW-I14**
 START DATE: **7/8/14** END DATE: **7/8/14**

PROJECT NAME: **Kortray**
 SITE LOCATION: **Branford, NY**
 DRILLING CO.: **PW**
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273206**
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR:
 LONGITUDE:

PROJECT MANAGER: **J. Santacruce**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Cloudy, 80°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							WEIGHT(S)	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	FALL		CASING	TUBE	DATE 2:	DEPTH 2:	RIG TYPE:
							TYPE						
ID/OD							GEOLOGIC DESCRIPTION					LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0		.2	0				No Recovery 0-4'						
2.0													
4.0		1.2	1558	X			4-5: L. Brown FMC SAND, trace gravel 5-5.2: Black FMC SAND, odor						
6.0													
8.0			1602	X			8-8.5: Little Recovery, but what was recovered Black fm SAND, odorous						
10.0													
12.0							set screen @ 8-12' *collected GW-I14 @ 14:45						
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: *GW-116*

START DATE: *7/9/14* END DATE: *7/9/14*

PROJECT NAME: *Karkay*
 SITE LOCATION:
 DRILLING CO.: *RW*
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: *60275206*
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK:
 INSPECTOR: *RM*
 LONGITUDE:

PROJECT MANAGER: *John Santoro*
 DRILLING METHOD: *Geoprobe*
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: *Sunny 65°*
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION						HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)	DATE 2:	DEPTH 2:	TIME 2:	
							FALL TYPE ID/OD	CASING	TUBE	CORE	RIG TYPE:
GEOLOGIC DESCRIPTION									LITHOLOGY/ SOIL TYPE		WATER LEVEL
0.0		<i>2.5'</i>	<i>0</i>								
2.0											
4.0		<i>3.2</i>	<i>0</i>								
6.0											
8.0		<i>3'</i>	<i>0</i>								
10.0											
12.0											
14.0											
16.0											
18.0											
20.0											

** Collected GW-116 @ 7:45*
Set Screen 8'-12'



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BOREHOLE LOG

BORING ID #: **GW-I/8**

START DATE: **7/9** END DATE: **7/9**

PROJECT NAME: **Kerkay**
 SITE LOCATION: **Broadalbin**
 DRILLING CO.: **PW**
 BOREHOLE DIAMETER: **3"**
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273286**
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **RM**
 LONGITUDE:

PROJECT MANAGER: **Santacrose**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny 70°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE ID/OD		TUBE	CORE	RIG TYPE:	
GEOLOGIC DESCRIPTION										LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0			0									
	2.5		0									
2.0												
4.0			0									
	3.5		0									
6.0												
8.0												
	4		3.8									
10.0												
12.0												
14.0												
16.0												
18.0												
20.0												

* Collected GW-I/8 @ 8:55
 Set Screen 8-12'



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BOREHOLE LOG

BORING ID #: **GW-IA**
 START DATE: **7/9/14** END DATE: **7/9**

PROJECT NAME: **Korkay**
 SITE LOCATION:
 DRILLING CO.: **PN**
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **6273286**
 BORING LOCATION: **In crypt-of-mex in front of house**
 DRILLER:
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **Rm**
 LONGITUDE:

PROJECT MANAGER: **Santacroce**
 DRILLING METHOD: **geopipe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny 75°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION						HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)	DATE 2:	DEPTH 2:	TIME 2:	
							FALL TYPE ID/OD	CASING	TUBE	CORE	RIG TYPE:
GEOLOGIC DESCRIPTION									LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0		4	0								
2.0											
4.0		2	0								
6.0											
8.0		4	7.9 2163								
10.0			186								
12.0											
14.0											
16.0											
18.0											
20.0											

0-4: L. Brown fine to medium SAND
 (Hand-cleared)

Dry/Low

4-6: L. Brown FM SAND, wet

wet

7.5

8-10: Grayish-Brown FM SAND, no odor
 10-11: Blackish-Gray FM SAND, odor

wet

11-11.5: Grayish/Brown FM SAND, odor
 11.5-12: Brown/gray Fine SAND w/ Trace SILT

wet

* Collected GW-IA @ 9:20
 sat screen @ 8-12'



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BOREHOLE LOG

BORING ID #: **GW-I20**
 START DATE: **7/9** END DATE: **7/9**

PROJECT NAME: **Kirkat**
 SITE LOCATION:
 DRILLING CO.: **PW**
 BOREHOLE DIAMETER:
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **00278286**
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **RM**
 LONGITUDE:

PROJECT MANAGER: **Santacruce**
 DRILLING METHOD: **Grapple**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny 75°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1: DATE 2:	DEPTH 1: DEPTH 2:	TIME 1: TIME 2:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUC	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:
							FALL TYPE ID/OD					
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL
0.0												
	4'											
2.0												
4.0			13.2									
	2'											
6.0												
8.0			11.6									
	3'		389	X								
10.0												
12.0												
14.0												
16.0												
18.0												
20.0												

0-4: L. Brown FMC SAND w/ Trace Gravel (Hand-cleared)

4-5: SAA
 5-6: L. Brown FMC SAND, wet

8-10: Greyish / Brown FMC SAND
 10-10.5: Blackish / Gray FM SAND, soupy, odor
 10.5-11: Brown Fine SAND w/ Trace SILT
 slight odor

* Collected GW-I20 @ 9:45
 set Screen @ 8-12'



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BOREHOLE LOG

BORING ID #: **GW-I21**

START DATE: **7/9** END DATE: **7/9**

PROJECT NAME: **Korkey**
 SITE LOCATION: **Greenburgh, NY**
 DRILLING CO.: **RW**
 BOREHOLE DIAMETER: **3"**
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273286**
 BORING LOCATION:
 DRILLER:
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **RM**
 LONGITUDE:

PROJECT MANAGER: **Santacrose**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny 75°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION						HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)	DATE 2:	DEPTH 2:	TIME 2:	
							FALL TYPE ID/OD	CASING	TUBE	CORE	RIG TYPE:
GEOLOGIC DESCRIPTION									LITHOLOGY/ SOIL TYPE	WATER LEVEL	
0.0		25'	0								
2.0											
4.0		4'	0 224								
6.0											
8.0		8'	.2								
10.0											
12.0											
14.0											
16.0											
18.0											
20.0											

* collected GW-I21 @ 10:25
 set Screen @ 6'-10'



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BOREHOLE LOG

BORING ID #: **GW-I22**
 START DATE: **7/9** END DATE: **7/9**

PROJECT NAME: **Korkay**
 SITE LOCATION: **Broadaloin**
 DRILLING CO.: **PN**
 BOREHOLE DIAMETER: **3"**
 TOTAL DEPTH REACHED:
 LATITUDE:

PROJECT NO.: **60273286**
 BORING LOCATION: **center behind fence**
 DRILLER:
 DEPTH TO BEDROCK: **N/A**
 INSPECTOR: **RM**
 LONGITUDE:

PROJECT MANAGER: **Santacrose**
 DRILLING METHOD: **Geoprobe**
 TOTAL DEPTH DRILLED:
 WEATHER CONDITIONS: **Sunny 70°**
 ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION						HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)	DATE 2:	DEPTH 2:	TIME 2:	
							FALL	CASING	TUBE	CORE	RIG TYPE:
							TYPE	GEOLOGIC DESCRIPTION			
ID/OD											
0.0		5.	0 0								
2.0											
4.0		1-	0 0								
6.0											
8.0		4-	0 0								
10.0											
12.0											
14.0											
16.0											
18.0											
20.0											

0-1' Dark Brown organic soil
 1-2' L. Brown FMC SAND
 Dry

4-6: SAA, wet
 6-7: Thin black (rus, no odor (N5) organic matter
 7-8: L. Brown fine SAND, wet, no odor
 wet/loose 004'

8-10: SAA, soupy, no odor
 10-12: L. Brown fine SILT w/ CLAY, confining layer
 wet/stiff

* collected GW-I22 @ 10:50
 set screen 6'-10'



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BOREHOLE LOG

BORING ID #: **GW-26**

START DATE: 8/3/15 END DATE: 8/3/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 90
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:
							FALL TYPE					
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL ----- - REMARKS
0.0		2.2	600.0	N		N						
2.0												
4.0		3.0	750.0	N		N						WT @ 6'
6.0												
8.0		3.3	384 ppm 10 ppm 338 ppm 122 ppm	N		N						
10.0												
12.0												
14.0												
16.0												
18.0												
20.0												

Collected GW-26 @ 15:00
 Set screen 8 - 12'



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BOREHOLE LOG

BORING ID #: **GW-28**

START DATE: 8/3/15 END DATE: 8/3/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 90
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:
							FALL TYPE					
							ID/OD					
GEOLOGIC DESCRIPTION							LITHOLOGY/ SOIL TYPE			WATER LEVEL ----- - REMARKS		
0.0 2.0		2.5	1400.0	N		N	0 - 2.5: Black FMC SAND; overburden					
4.0 6.0		3.3	280.0 1900.0	N		N	4 - 7: SAA; dry 7 - 7.5: Tan/brown Silt with fine SAND; wet					WT @ 7'
8.0 10.0		3.5	4200.0 3051.0	N		N	8 - 9.5: Brown FM SAND; no odor; wet 9.5 - 11.5: Brown Silt and fine Sand; wet; odor					
Collected GW-28 @ 16:06 Set screen 8 - 12'												
12.0 14.0												
16.0 18.0												
20.0												



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BOREHOLE LOG

BORING ID #: **GW-29**

START DATE: 8/4/15 END DATE: 8/4/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 70
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:
							FALL TYPE					
							ID/OD					
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL ----- - REMARKS
0.0		3.0	0.0	N		N						
2.0							0 - 3: Brown-Black FM SAND; dry; no odors					
4.0		3.0	765.0 1300.0	N		N	4 - 5.5: SAA; moist; no odors 5.5 - 7: Brown FM SAND; wet; no odors					WT @ 5.5'
6.0												
8.0		4.0	3700.0 245.0	N		N	8 - 10: Brown FMC SAND; wet; black layer @ 9.1 - 9.3'; no odors 10 - 12: Brown Clayey-Silt; high plasticity; soft					
10.0							Collected GW-29 @ 08:40 Set screen 8 - 12'					
12.0												
14.0												
16.0												
18.0												
20.0												



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BOREHOLE LOG

BORING ID #: **GW-30**

START DATE: 8/4/15 END DATE: 8/4/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 75
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:	
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:	
							FALL TYPE						
ID/OD	GEOLOGIC DESCRIPTION						LITHOLOGY/ SOIL TYPE		WATER LEVEL				
												REMARKS	
0.0		2.5	100.0	N		N							
2.0							0 - 1: Black organic overburden 1 - 2.5: Brown FMC SAND; dry; no odors						
4.0		4.0	584.0	N		N	4 - 8: Brown FMC SAND; moist; no odor						WT @ 5.5'
6.0													
8.0		4.0	565.0	N		N	8 - 12: Brown FM SAND; wet; loose; no odors						
10.0							Collected GW-30 @ 09:20 Set screen 8 - 12'						
12.0													
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: **GW-31**

START DATE: 8/4/15 END DATE: 8/4/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 80
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)			DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE			CASING	TUBE	CORE
							GEOLOGIC DESCRIPTION				LITHOLOGY/ SOIL TYPE	WATER LEVEL ----- - REMARKS
0.0		2.6	100.0	N		N						
2.0							0 - 2.6: Light brown FM(+)C SAND; dry					
4.0		3.0	38.0	N		N	4 - 5.5: SAA 5.5 - 7: Light brown FM SAND; wet; no odor					WT @ 5.5'
6.0												
8.0		4.0	628.0 2600.0	N		N	8 - 10: SAA 10 - 11: Brown MC SAND; wet; loose					
10.0							Collected GW-31 @ 10:00 Set screen 8 - 12'					
12.0												
14.0												
16.0												
18.0												
20.0												



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BOREHOLE LOG

BORING ID #: **GW-33**

START DATE: 8/4/15 END DATE: 8/4/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 80
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)			DATE 2:	DEPTH 2:	TIME 2:
							FALL TYPE			CASING	TUBE	CORE
ID/OD	GEOLOGIC DESCRIPTION							LITHOLOGY/ SOIL TYPE	WATER LEVEL	REMARKS		
0.0		1.0	40.0	N		N						
2.0												
4.0		2.0	28.0	N		N						
6.0												
8.0		3.4	2.0	N		N						WT @ 8'
10.0												
12.0												
14.0												
16.0												
18.0												
20.0												

Collected GW-33 @ 11:25
 Set screen 8 - 12'



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BOREHOLE LOG

BORING ID #: **GW-35**

START DATE: 8/4/15 END DATE: 8/4/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 80
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:	
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:	
							FALL TYPE						
							ID/OD						
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL ----- - REMARKS	
0.0		2.4	0.0	N		N							
2.0							0 - 1: Concrete overburden 1 - 2.4: Light brown FM(+) SAND; dry; no odors						
4.0		4.0	1120.0 965.0	N		N	4 - 6.2: SAA 6.2 - 8: Brown FMC SAND; wet; no odors					WT @ 6.2'	
6.0													
8.0		3.0	1112.0	N		N	8 - 11: Brown F(+)M SAND; firm; compact; no odors 11 - 11.2: Brown Silt						
10.0							Collected GW-35 @ 13:40 Set screen 8 - 12'						
12.0													
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: **GW-36**

START DATE: 8/4/15 END DATE: 8/4/15

PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 80
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:	
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:	
							FALL TYPE						
							ID/OD						
GEOLOGIC DESCRIPTION											LITHOLOGY/ SOIL TYPE	WATER LEVEL ----- REMARKS	
0.0		2.5	0.0	N		N							
2.0							0 - 2.5: Light brown FMC SAND; dry						
4.0		3.0	58.0 1950.0	N		N	4 - 6.1: Brown FM(+)C SAND; dry 6.1 - 7: SAA; wet					WT @ 6.1'	
6.0													
8.0		3.3	94 ppm 2500.0	Y		N	8 - 8.7: Black FMC(+) SAND; odor 8.7 - 11.3: Brown Silty-Sand; compact; no odors						
10.0							Collected GW-36 @ 14:10 Set screen 8 - 12'						
12.0													
14.0													
16.0													
18.0													
20.0													



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BOREHOLE LOG

BORING ID #: **GW-37**

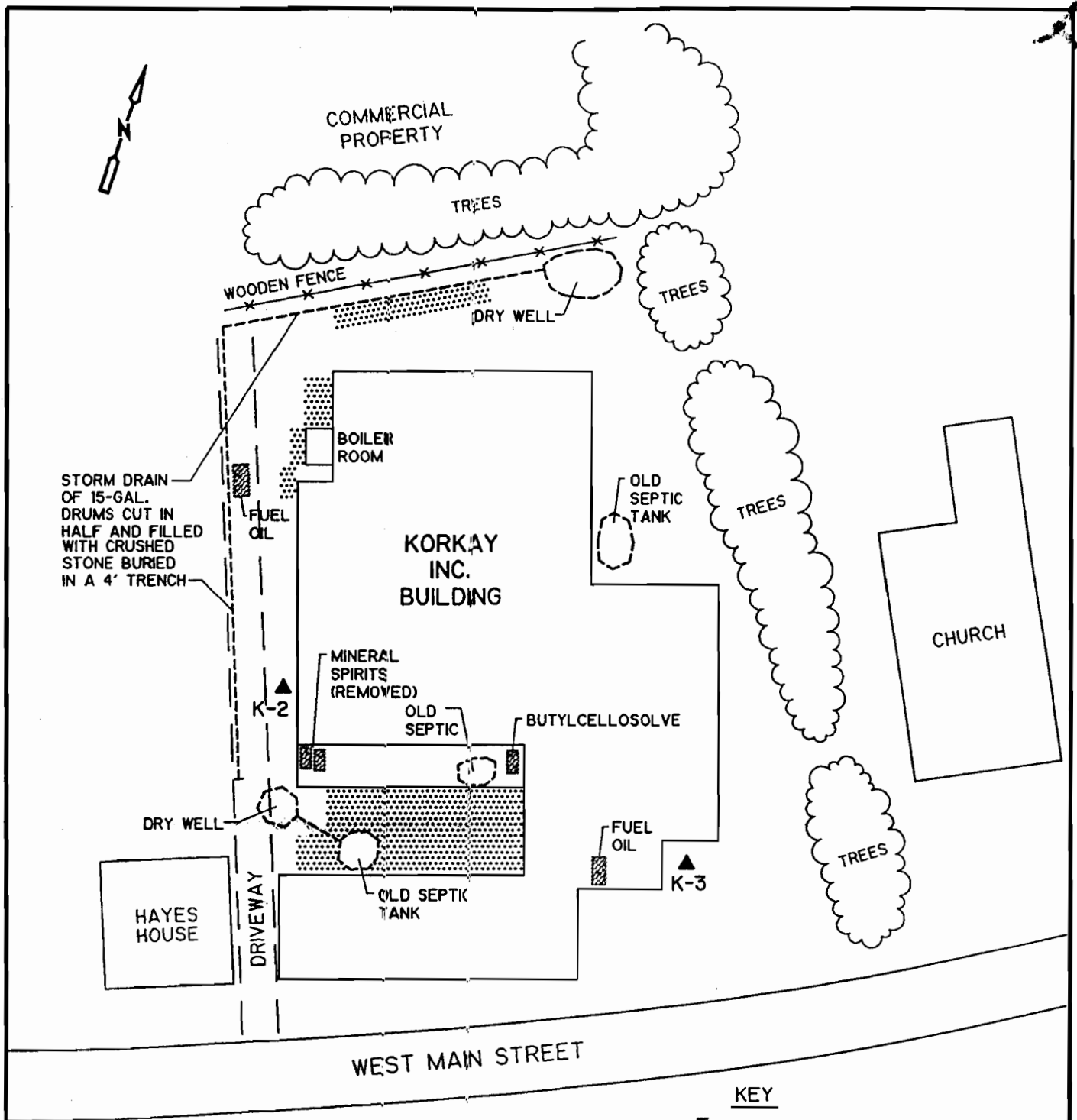
START DATE: 8/4/15 END DATE: 8/4/15




PROJECT NAME: Korkay, Inc	PROJECT NO.: 60273289	PROJECT MANAGER: Walter Howard
SITE LOCATION: 70 W Main St Broadalbin, NY	BORING LOCATION:	
DRILLING CO.: Parratt Wolff	DRILLER: Layne	DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2"	DEPTH TO BEDROCK: NA	TOTAL DEPTH DRILLED: 12'
TOTAL DEPTH REACHED: 12'	INSPECTOR: RM	WEATHER CONDITIONS: Sunny, 80
LATITUDE:	LONGITUDE:	ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION							HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
DEPTH (feet bgs)	Blow Count	RECOVERY	PID Headspace(ppb)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	WEIGHT(S)		CASING	TUBE	CORE	RIG TYPE:
							FALL TYPE					
ID/OD	GEOLOGIC DESCRIPTION						LITHOLOGY/ SOIL TYPE		WATER LEVEL ----- - REMARKS			
0.0 2.0		2.0	12.0	N		N						
4.0 6.0		3.0	492.0	N		N						WT @ 4'
8.0 10.0		4.0	680.0 500.0	N		N						
12.0 14.0												
16.0 18.0												
20.0												

Collected GW-37 @ 15:05
 Set screen 8 - 12'

Appendix E
Site Map
Circa 1988



- KEY**
-  UNDERGROUND STORAGE TANKS
 -  DRUM STORAGE AREA
 -  EXISTING (SHALLOW) GROUNDWATER MONITORING WELL LOCATION
- K-2

Source of base map: EA Phase II Investigation Report, April 1988

Not to Scale.

Figure 6
Site Map

CDM
environmental engineers, scientists,
planners, & management consultants

Korkay Inc. Site - Broadalbin, New York
NYSDEC Site #5-18-014

Appendix F
Site Management
Investigation Results

Table 1
Groundwater Analytical Data
Korkay, Inc.
Broadalbin, New York
Site #5-18-014

Sampling Dates:
August 2007 to June 2013

Well ID	AWQS or GV	MW-8D					MW-8S					MW-15D					MW-15S																				
		8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13																
1,1,1-Trichloroethane	5	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
1,2,4-Trimethylbenzene	5	5	U	1.6	J	5	U	1.0	U	10	U	430	D	89		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	14	JN		
1,2-Dichlorobenzene	3	5	U	5	U	5	U	1.0	U	10	U	26		5.6		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
1,3,5-Trimethylbenzene	5	5	U	5	U	5	U	1.0	U	10	U	97		36		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10	U		
1,4-Dichlorobenzene	3	5	U	5	U	5	U	1.0	U	10	U	3	J	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
2-Butanone	NS	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
4-Isopropyltoluene	5	5	U	5	U	5	U	1.0	U	10	U	20		5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10	U		
Acetone	50 (GV)	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
Carbon Disulfide	60 (GV)	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
Chloroethane	5	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1	J	5*	U	1.0	U		
Chloromethane	NS	5	U	5	U	3.1	J	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	4.4*	J	1.0	U		
cis-1,2-Dichloroethene	5	5	U	5	U	5	U	1.0	U	10	U	9		1.3	J	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
Cyclohexane	NS	NA		NA		NA		1.0	U	10	U	NA		NA		NA		NA		1.0	U	10	U	NA		NA		NA		NA		NA		1.0	U		
Ethylbenzene	5	5	U	5	U	5	U	1.0	U	10	U	57		11		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
Isopropylbenzene	5	5	U	5	U	5	U	1.0	U	10	U	27		9.6		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
Methylcyclohexane	NS	NA		NA		NA		1.0	U	10	U	NA		NA		NA		NA		1.0	U	10	U	NA		NA		NA		NA		2.6		2	J		
m,p-Xylene	5	5	U	5	U	5	U	2.0	U	NA		160		28		5	U	5	U	2.0	U	NA		5	U	5	U	5	U	5*	U	2.0	U	NA			
n-Butylbenzene	5	5	U	5	U	5	U	1.0	U	10	U	45		12		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	8		24		3.5	J	1.1*	J
n-Propylbenzene	5	5	U	5	U	5	U	1.0	U	10	U	34		14		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	2.6	J	5	U	5*	U		
Naphthalene	10 (GV)	5	U	1.2	J	5	U	1.0	U	10	U	58		10		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
o-Xylene	5	5	U	5	U	5	U	1.0	U	10	U	120		19		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0		NA			
sec-Butylbenzene	5	5	U	5	U	5	U	1.0	U	10	U	22		6.8		5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	18		2.8	J	5*	U		
tert-Butylbenzene	5	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.4	J	5	U	5*	U		
Tetrachloroethene	5	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	2	J	5	U	5*	U		
Toluene	5	5	U	5	U	5	U	1.0	U	10	U	1	J	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	13		1.3	J	5	U		
Trichloroethene	5	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	U	10	U		
Xylene (Total)	NS	5	U	5	U	5	U	2.0	U	10	U	280		47		5	U	5	U	2.0	U	10	U	5	U	5	U	5	U	5*	U	1.0	J	10	U		
Total Volatile Organic Compounds	ND			2.8	J	3	J	ND		ND		1,109	DJ	242	J	ND		ND		ND		ND		ND		ND		ND		ND		124	J	133.3	J		
Semivolatile Organic Compounds (µg/L)																																					
1,2-Dichlorobenzene	3	10	U	NA		NA		4.7	U	NA		21		NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
1,4-Dichlorobenzene	3	10	U	NA		NA		4.7	U	NA		2	J	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
2,4-Dimethylphenol	1	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
2-Methylnaphthalene	NS	10	U	NA		NA		4.7	U	NA		7	J	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
2-Methylphenol	NS	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
4-Methylphenol	NS	10	U	NA		NA		9.4	U	NA		14		NA		NA		NA		9.4	U	NA		10	U	NA		NA		NA		NA		9.4	U		
Acenaphthene	20 (GV)	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
Acenaphthylene	NS	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
Acetophenone	NS	NA		NA		NA		4.7	U	NA		NA		NA		NA		NA		4.7	U	NA		NA		NA		NA		NA		NA		73	NA		
Biphenyl	5	NA		NA		NA		4.7	U	NA		NA		NA		NA		NA		4.7	U	NA		NA		NA		NA		NA		NA		4.7	U		
bis (2-Ethylhexyl) phthalate	5	2	J	NA		NA		4.7	U	NA		2	J	NA		NA		NA		4.7	U	NA		2	J	NA		NA		NA		NA		4.7	U		
Diethyl phthalate	50 (GV)	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
Di-n-butylphthalate	50	10	U	NA		NA		4.7	U	NA		1	J	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		
Dibenzofuran	NS	10	U	NA		NA		9.4	U	NA		10	U	NA		NA		NA		9.4	U	NA		10	U	NA		NA		NA		NA		9.4	U		
Fluorene	50 (GV)	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		NA		NA		4.7	U		

Table 1

Groundwater Analytical Data
Korkay, Inc.
Broadalbin, New York
Site #5-18-014

Sampling Dates:
August 2007 to June 2013

Well ID	Volatile Organic Compounds (µg/L)	AWQS or GV	ASW					FLUSHMOUNT					K-2					K-3																															
			8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13																											
1,1,1-Trichloroethane	5	5	U	25	U	25	U	1.0	U	1.0*	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U														
1,2,4-Trimethylbenzene	5	130	D	1,100	D	860		1.0	U	1.0*	U	410	JN	5	U	5	U	5	U	1.0	U	10	U	60		60*	U	81		2.5	J	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
1,2-Dichlorobenzene	3	24		34		26		35		36*		35		5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
1,3,5-Trimethylbenzene	5	31	D	360		280		1.0	U	1.0*	U	730	JN	5	U	5	U	5	U	1.0	U	10	U	3	J	3*	U	8.4		5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
1,4-Dichlorobenzene	3	3	J	25	U	25	U	5.1		5.3*		5	J	5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
2-Butanone	NS	14		13	J	25	U	8.9	J	9.2*	J	49		5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	10*	U
4-Isopropyltoluene	5	39		61		25	U	1.0	U	1.0*	U	1	U	5	U	5	U	5	U	1.0	U	10	U	2	J	2*	J	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	10*	U
Acetone	50 (GV)	5	U	25	U	25	U	10		10*		43		5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	3.7	J	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U				
Carbon Disulfide	60 (GV)	5	U	25	U	25	U	1.0	U	1.0*	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Chloroethane	5	5	U	25	U	25	U	0.42	J	1.0*	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	0.67	J	10	U	5	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Chloromethane	NS	5	U	25	U	25	U	1.0	U	1.0*	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	NA		2.5	J	1.0	U	10	U	5	U	5	U	4.8	J	1.0	U	10	U	10*	U		
cis-1,2-Dichloroethene	5	53		72		24	J	26		26*		21	Z	5	U	5	U	5	U	1.0	U	10	U	4	J	4*	J	6.2		5	U	4.2		10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Cyclohexane	NS	NA		NA		NA		4.6		4.6*		4	J	NA		NA		NA		1.0	U	10	U	NA		NA		NA		1.0	U	10	U	NA		NA		NA		1.0	U	10	U	10*	U				
Ethylbenzene	5	65	D	430		150		160	D	160*	D	220	D	5	U	5	U	5	U	1.0	U	10	U	12		13*		9.3		5	U	13		10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Isopropylbenzene	5	49		86		50		56		56*		62		5	U	5	U	5	U	1.0	U	10	U	4	J	4*	J	5.7		5	U	2.6		10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Methylcyclohexane	NS	NA		NA		NA		36		37*		41		NA		NA		NA		1.0	U	10	U	NA		NA		NA		2.3		10	U	NA		NA		NA		1.0	U	10	U	10*	U				
m,p-Xylene	5	320	D	2,100	D	710		730	D	710*	D	NA		5	U	5	U	5	U	2.0	U	NA		16		16*		14		5	U	19		NA		5	U	5	U	5	U	2.0	U	NA	NA	NA	NA		
n-Butylbenzene	5	60		91		73		1.0	U	1.0*	U	1	U	5	U	5	U	5	U	1.0	U	10	U	8		8*		23		1.3	J	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
n-Propylbenzene	5	74		120		87		1.0	U	1.0*	U	140	JN	5	U	5	U	5	U	1.0	U	10	U	4	J	4*	J	13		5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Naphthalene	10 (GV)	130		160		100		1.0	U	1.0*	U	1	U	5	U	5	U	5	U	1.0	U	10	U	10	B	8*	B	5.4		5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
o-Xylene	5	210	D	1,000	D	430		450	D	440*	D	NA		5	U	5	U	5	U	1.0	U	NA		30		30*		17		5	U	24		NA		5	U	5	U	5	U	1.0	U	NA	NA	NA	NA		
sec-Butylbenzene	5	28		46		37		1.0	U	1.0*	U	1	U	5	U	5	U	5	U	1.0	U	10	U	6		6*		18		5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
tert-Butylbenzene	5	5	U	25	U	25	U	1.0	U	1.0*	U	1	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Tetrachloroethene	5	5	U	25	U	25	U	0.65	J	0.67*	J	4	J	5	U	5	U	5	U	1.0	U	10	U	2	JB	2*	JB	1.5	J	5	U	0.64	J	10	U	5	U	1.2	J	5	U	0.77	J	10	U	10*	U		
Toluene	5	19		26		22	J	21		21*		18		5	U	5	U	5	U	1.0	U	10	U	5	U	5*	U	5	U	0.59	J	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U				
Trichloroethene	5	5	U	8.2	JB	25	U	0.51	J	0.53*	J	5	J	5	U	5	U	5	U	1.0	U	10	U	1	J	5*	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	10*	U		
Xylene (Total)	NS	530	D	3,100	D	1,100		1,200	D	1,200*	D	1,800	D	5	U	5	U	5	U	2.0	U	10	U	46		46*		31		5	U	43		5	J	5	U	5	U	5	U	2.0	U	10	U	4*	J		
Total Volatile Organic Compounds		1,249	DJ	5,707	DJB	2,849	J	1,544.18	JD	#####	JD	3,587	JNZD	ND		ND		ND		ND		ND		162	JB	157	JB	203	J	6	J	70.7	J	5	J	ND		1.2	J	5	J	0.77	J	ND		4	J		
Semivolatile Organic Compounds (µg/L)																																																	
1,2-Dichlorobenzene	3	19	J	NA		NA		4.7	U	4.7*	U	NA		10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA	NA	NA	NA		
1,4-Dichlorobenzene	3	2	J	NA		NA		5.1		5.3*		NA		10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA	NA	NA	NA		
2,4-Dimethylphenol	1	20	U	NA		NA		1.5	J	1.1*	J	NA		10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA	NA	NA	NA		
2-Methylnaphthalene	NS	50		NA		NA		57		55*		NA		10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA	NA	NA	NA		
2-Methylphenol	NS	20	U	NA		NA		4.7	U	4.7*	U	NA		10	U	NA		NA		4.7	U	NA		10	U	NA		NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA	NA	NA	NA		
4-Methylphenol	NS	170		NA		NA																																											

Table 1
Groundwater Analytical Data
Korkay, Inc.
Broadalbin, New York
Site #5-18-014

Sampling Dates:
August 2007 to June 2013

Well ID	Volatile Organic Compounds (µg/L)	AWQS or GV	VEW-1					VEW-2					VEW-3					VEW-4																							
			8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13	8/14/07	11/25/08	3/25/10	1/10/12	6/25/13																			
1,1,1-Trichloroethane	5	2	J	5	U	13	U	1.0	U	10	U	5	U	5	U	1.0	U	10	U	10	U	5	U	5	U	1.0	U	10	U	10	U										
1,2,4-Trimethylbenzene	5	230	D	410	D	220	U	1.0	U	10	U	22	U	9.8	U	1.0	U	10	U	10	U	130	U	130	U	2	J	1.0	U	37	JN	12	U	170	U	3.1	J	1.0	U	28	JN
1,2-Dichlorobenzene	3	23		34		19		24		17		1	J	1.2	J	5	U	1.0	U	10	U	30		25		5	U	3.1		5	J	2	J	16		5	U	3.9	J	1	J
1,3,5-Trimethylbenzene	5	230	D	410	D	200	U	1.0	U	240	JN	1	J	5	U	5	U	1.0	U	10	U	110	U	110	U	1.8	J	1.0	U	28	JN	6	U	100	U	2.1	J	1.0	U	20	JN
1,4-Dichlorobenzene	3	1	J	2.3	J	13	U	1.0	U	10	U	5	U	5	U	1.0	U	10	U	10	U	1.0	J	5	U	5	U	1.0	U	10	U	5	U	1	J	5	U	1.0	U	10	U
2-Butanone	NS	13		17		13	U	2.5	J	10	U	5	U	5	U	5	U	1.0	U	10	U	9		11		5	U	3.2	J	10	U	5	U	8.1		5	U	3.0	J	10	U
4-Isopropyltoluene	5	36		5	U	59		1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	12		12		5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U
Acetone	50 (GV)	10		34		13	U	6.2	J	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	10	U	10	U	70		8.8		5	U	5.2	J	10	U
Carbon Disulfide	60 (GV)	1	J	5	U	13	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U
Chloroethane	5	5	U	5	U	4.7	J	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U
Chloromethane	NS	5	U	5	U	6.7	J	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	5	U	5	U	6.1		1.0	U	10	U
cis-1,2-Dichloroethene	5	130		84		39		22		5	J	39		4.6	J	5	U	1.0	U	10	U	4	J	2.6	J	5	U	1.0	U	10	U	2	J	3.5	J	5	U	2.0		10	U
Cyclohexane	NS	NA		NA		NA	0.47	J	10	U	NA		NA		NA		1.0	U	10	U	NA		NA		NA		1.0	U	10	U	NA		NA		NA		1.0	U	10	U	
Ethylbenzene	5	29		54		28		25		24		5		1.6	J	5	U	1.0	U	10	U	32		38		5	U	6.6		10		5	U	17		5	U	4.3		10	U
Isopropylbenzene	5	11		23		12	J	13		11		5	U	5	U	5	U	1.0	U	10	U	6		6.9		5	U	0.87	J	1	J	5	U	4.5	J	5	U	2.0		10	U
Methylcyclohexane	NS	NA		NA		NA		3.4		3	JZ	NA		NA		NA		1.0	U	10	U	NA		NA		NA		1.0	U	10	U	NA		NA		NA		0.81	J	10	U
m,p-Xylene	5	49		100		51		47		NA		5		1.8	J	5	U	2.0	U	NA		120		150		2.9	J	22		NA	U	4	J	84		1.5	J	18		NA	
n-Butylbenzene	5	54		5	U	47		1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	17		15		5	U	1.0	U	10	U	5	U	14		5	U	1.0	U	10	U
n-Propylbenzene	5	14		30		19		1.0	U	10	U	1	J	1.1	J	5	U	1.0	U	10	U	7		8.9		5	U	1.0	U	10	U	5	U	3.3	J	5	U	1.0	U	10	U
Naphthalene	10 (GV)	110	B	5	U	78		1.0	U	10	U	6	B	4.4	J	5	U	1.0	U	10	U	70		45		1.8	J	1.0	U	10	U	18		60		5	U	1.0	U	10	U
o-Xylene	5	250	D	330	D	160		1.0	U	NA		17		4.5	J	5	U	1.0	U	NA		110		110		2.1	J	16		NA	U	20		180		2.5	J	36		NA	
sec-Butylbenzene	5	17		5	U	19		1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	4	J	5.1		5	U	1.0	U	10	U	5	U	4.1	J	5	U	1.0	U	10	U
tert-Butylbenzene	5	4	J	5	U	13	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U	2	J	5	U	5	U	1.0	U	10	U	5	U	5	U	5	U	1.0	U	10	U
Tetrachloroethene	5	2	JB	1.7	J	13	U	0.99	J	1	J	5	U	5	U	5	U	1.0	U	10	U	1	J	1.2	J	5	U	1.4		10	U	5	U	3	J	5	U	0.45	J	10	U
Toluene	5	4	J	4.4	J	3.4	J	1.6		2	J	3	J	5	U	5	U	1.0	U	10	U	5	U	7.9		5	U	3.2		4	J	2	J	7.8		5	U	1.6		10	U
Trichloroethene	5	2	J	3.1	J	13	U	1.6		2	J	5	U	5	U	5	U	0.88	J	3	J	5	U	5	U	5	U	1.0	U	10	U	5	U	3	J	1	J	1.2		2	J
Xylene (Total)	NS	299	D	420		220		230	D	210		22		6.3		5	U	2.0	U	10	U	230		260		5	U	38		64		24		270		4	J	54		13	
Total Volatile Organic Compounds	1,222	JDB	#####	DJ	966	J	327.76	JD	515	JNZ	100	JB	29	J	ND	0.88	J	3	J	665	J	679	J	11	J	56.37	J	149	JN	136	J	688.1	J	16	J	78.46	J	64	JN		
Semivolatile Organic Compounds (µg/L)																																									
1,2-Dichlorobenzene	3	25		NA		NA		4.7	U	NA		1	J	NA		NA		4.7	U	NA		21		NA		4.7	U	NA		5	J	NA		NA		4.7	U	NA			
1,4-Dichlorobenzene	3	2	J	NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA		10	U	NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA			
2,4-Dimethylphenol	1	10	U	NA		NA		4.7	U	NA		4	J	NA		NA		4.7	U	NA		10	U	NA		4.7	U	NA		9	J	NA		NA		3.7	J	NA			
2-Methylnaphthalene	NS	24		NA		NA		15		NA		10	U	NA		NA		4.7	U	NA		2	J	NA		4.7	U	NA		1	J	NA		NA		4.6	J	NA			
2-Methylphenol	NS	10	U	NA		NA		4.7	U	NA		6	J	NA		NA		4.7	U	NA		10	U	NA		4.7	U	NA		20		NA		NA		4.7	U	NA			
4-Methylphenol	NS	56		NA		NA		95		NA		3	J	NA		NA		9.4	U	NA		10	U	NA		9.4	U	NA		110		NA		NA		8.2	J	NA			
Acenaphthene	20 (GV)	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA		10	U	NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA			
Acenaphthylene	NS	10	U	NA		NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA		10	U	NA		4.7	U	NA		10	U	NA		NA		4.7	U	NA			
Acetophenone	NS	NA		NA		NA		180		NA		NA		NA		NA		4.7	U	NA		NA		NA		6.8		NA		NA		NA		NA		120		NA			
Biphenyl	5	NA		NA		NA		4.7	U	NA		NA		NA		NA		4.7	U	NA		NA		NA		4.7	U	NA		NA		NA		NA		4.7	U	NA			
bis (2-Ethylhexyl) phthalate	5	1	J	NA		NA		4.7	U	NA		1	J	NA		NA		4.7	U	NA		1	J	NA		4.7	U	NA		2	J	NA									

Table 2
VOC Results
Korkay July 2014 Groundwater Investigation

Sample Location		Off Site East			On-Site										Off Site West			Off Site Right of Way South				Off Site North			
Sample ID	NYSDEC AWQS & GV ug/L	GW-1 7/7/2014 1:18 PM	GW-2 7/7/2014 3:00 PM	GW-3 7/7/2014 4:00 PM	GW-4 7/7/2014 4:30 PM	GW-5 7/8/2014 7:45 AM	GW-6 7/8/2014 8:10 AM	GW-7 7/8/2014 8:40 AM	GW-8 7/8/2014 9:00 AM	GW-9 7/8/2014 10:00 AM	GW-13 7/8/2014 1:45 PM	GW-14 7/8/2014 2:45 PM	GW-15 7/8/2014 4:30 PM	GW-16 7/9/2014 7:45 AM	GW-10 7/8/2014 10:45 AM	GW-11 7/8/2014 11:00 AM	GW-12 7/8/2014 11:35 AM	GW-17 7/9/2014 8:30 AM	GW-18 7/9/2014 8:55 AM	GW-19 7/9/2014 9:20 AM	GW-20 7/9/2014 9:45 AM	GW-21 7/9/2014 10:25 AM	GW-22 7/9/2014 10:50 AM	GW-23 7/9/2014 11:30 AM	
VOCs ug/L																									
STARS List VOCs (Petroleum)																									
1,2,4-Trimethylbenzene	5	ND	35	33	540	240	490	1300	710	0.82 J	220	70	230	1.1	670	180	180	ND	ND	360	200	5.5	1.1	ND	
1,3,5-Trimethylbenzene	5	ND	16	21	220	120	220	390	250	ND	54	35	73	ND	290	53	110	ND	ND	110	35	0.92 J	ND	ND	
Ethylbenzene	5	ND	0.87 J	ND	49	2.1	48	69	46	ND	82	22	33	ND	63	17	8.2	ND	ND	53	63	2.9	2.7	1.1	
N-Propylbenzene	5	ND	3.8	7.1	63	30	44	76	55	ND	20	7.2	25	ND	92	23	20	ND	ND	46	30	1.1	0.76 J	ND	
n-Butylbenzene	5	ND	22	67	110	47	93	110	72	ND	27	23	30	ND	110	25	59	ND	ND	62	27	1.1	ND	ND	
sec-Butylbenzene	5	ND	ND	34	50	30	35	47	33	ND	15	7.6	18	ND	36	12	25	ND	ND	31	18	ND	ND	ND	
tert-Butylbenzene	5	ND	ND	3.2	6.1	4.4	4.7 J	ND	3.9	ND	ND	ND	ND	ND	ND	1.6 J	ND	ND	ND	ND	ND	ND	ND	ND	
Isopropylbenzene	5	ND	1.8	1.4	28	7.4	24	30	24	ND	13	3.8	14	ND	35	11	6.8	ND	ND	24	17	ND	ND	ND	
Toluene	5	ND	ND	ND	7.2	ND	3.6 J	16	7.3	ND	2.8 J	11	ND	ND	ND	ND	ND	ND	ND	ND	4.2 J	ND	ND	ND	
4-Isopropyltoluene	5	ND	14	47	70	44	52	69	47	ND	21	15	24	0.31 J	50	16	35	ND	ND	32	8.2	0.35 J	ND	ND	
o-Xylene	5	ND	3.7	ND	140	6.8	140	340	140	ND	180	95	55	0.76 J	150	34	35	1	ND	100	120	4.8	3.2	0.99 J	
m,p-Xylene	5	ND	4.1	ND	210	5.3	230	490	230	ND	260	85	92	0.86 J	180	58	24	1.0 J	ND	170	110	4.6	2.4	0.72 J	
Xylenes, Total	5	ND	7.8	ND	350	12	370	830	370	ND	440	180	150	1.6 J	330	92	59	2	ND	270	230	9.4	5.6	1.7 J	
Naphthalene	10	ND	4.3	1.6	65	6.6	64	130	76	1.5	67	22	42	0.56 J	190	160	22	0.43 J	ND	44	22	1	0.89 J	0.48 J	
TCL List VOCs Non-STARS List																									
1,1-Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.96 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	3	ND	2.2	ND	23	ND	8.3	35	12	ND	ND	ND	12	ND	ND	5.3	ND	ND	16	9.1	ND	ND	ND	ND	
1,2,3-Trichlorobenzene	5	ND	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2,3-Trichloropropane	0.04	ND	ND	ND	ND	2.2	ND	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1,2,2-Tetrachloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.7 J	ND	ND	ND	ND	ND	ND	ND	
1,2,4-Trichlorobenzene	5	ND	ND	4.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,4-Dichlorobenzene	3	ND	ND	ND	ND	ND	ND	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
2-Butanone (MEK)	NS	ND	5.2 J	2.5 J	ND	5.0 J	20 J	ND	16	ND	10 J	20	5.5 J	1.4 J	ND	2.8 J	ND	1.4 J	ND	ND	ND	ND	ND	ND	
Acetone	50	11	27	11	22 J	19	48 J	31 J	24	6.0 J	21 J	52	12 J	16	ND	9.1 J	16 J	11	4.9 J	ND	20 J	9.6 J	4.5 J	12	
Bromodichloromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.99 J	ND	
Carbon disulfide	60	0.44 J	1.1	1.3	1.5 J	1.3	ND	3.7 J	2.2	0.50 J	ND	ND	ND	ND	ND	ND	1.5 J	ND	1.6	ND	ND	3.3	ND	ND	
Chloroform	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.69 J	ND	ND	ND	ND	ND	ND	ND	ND	
cis-1,2-Dichloroethene	5	ND	ND	ND	ND	ND	8	11	5.5	ND	ND	39	ND	ND	ND	ND	8.2	ND	ND	ND	17	ND	ND	ND	
Cyclohexane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.6 J	ND	3.2 J	ND	ND	2.4	ND	ND	ND	7.0 J	4.3 J	ND	ND	ND	
Dichlorodifluoromethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.79 J	ND	ND	ND	ND	ND	ND	
Methylcyclohexane	NS	ND	2.8	16	16	10	16	4.4 J	7.6	ND	10	3.1	6.1	0.78 J	13	5.8	5	ND	ND	15	7.7	0.82 J	0.76 J	ND	
Tetrachloroethene	5	ND	1.2	ND	14	3.6	16	52	15	ND	8.5	ND	3.6 J	0.69 J	7.6 J	1.8 J	ND	0.85 J	0.61 J	ND	ND	ND	ND	ND	
Trichloroethene	5	ND	ND	ND	ND	1.8	8.8	ND	1.2	ND	8.3	2.3	ND	ND	ND	5.7	ND	ND	ND	ND	ND	ND	ND	ND	

Bold- Analyte was detected in laboratory analysis

Highlight- Analyte was detected above the NYSDEC AWQS or Guidance Value

NS- No Standard

ND- Not detected above MDL

J - Result is estimated, detection was below the RL but above the MDL

Table 3
SVOC Results
Korkay July 2014 Groundwater Investigation

Sample Location	NYSDEC AWQS & GV ug/L	Off Site East	On-Site												Off Site West			Off Site Right of Way South					Off Site North				
		GW-1 7/7/2014 1:18 PM	GW-2 7/7/2014 3:00 PM	GW-3 7/7/2014 4:00 PM	GW-4 7/7/2014 4:30 PM	GW-5 7/8/2014 7:45 AM	GW-6 7/8/2014 8:10 AM	GW-7 7/8/2014 8:40 AM	GW-8 7/8/2014 9:00 AM	GW-9 7/8/2014 10:00 AM	GW-13 7/8/2014 1:45 PM	GW-14 7/8/2014 2:45 PM	GW-15 7/8/2014 4:30 PM	GW-16 7/9/2014 7:45 AM	GW-10 7/8/2014 10:45 AM	GW-11 7/8/2014 11:00 AM	GW-12 7/8/2014 11:35 AM	GW-17 7/9/2014 8:30 AM	GW-18 7/9/2014 8:55 AM	GW-19 7/9/2014 9:20 AM	GW-20 7/9/2014 9:45 AM	GW-21 7/9/2014 10:25 AM	GW-22 7/9/2014 10:50 AM	GW-23 7/9/2014 11:30 AM			
SVOCs ug/L																											
2,4-Dimethylphenol	1*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	NS	ND	ND	4.1	11	4.8	13	50	9.8	ND	7.1	2.9	1.3	9	ND	3.2	ND	ND	ND	ND	14	1	ND	ND	ND	ND	ND
2-Methylphenol	1*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2 J	ND	ND	ND	ND	ND	ND
Acetophenone	NS	2.6 J B	ND	ND	ND	ND	ND	ND	ND	2.0 B	ND	ND	ND	ND	ND	ND	2.7 J B	2.1 B	2.0 B	ND	62 B	1.7 B	1.7 B	2.2 B	ND	ND	ND
Benzaldehyde	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.1 J B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.002	ND	ND	ND	0.19 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.1 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	Non-Detect	ND	ND	ND	0.14 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.002	ND	ND	ND	0.32	ND	ND	ND	ND	ND	ND	0.30 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	NS	ND	ND	ND	0.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.002	ND	ND	ND	0.31	ND	ND	ND	ND	ND	ND	0.34 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Biphenyl	5	ND	ND	ND	ND	1	ND	0.67 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl) phthalate	5	100 B	410 B	350 B	39 B	31 B	18 B	69 B	10 B	20 B	6.3 B	81 B	12 B	5.6 B	34 J B	25 B	90 B	27 B	32 B	36 B	50 B	20 B	19 B	11 B	ND	ND	ND
Butyl benzyl phthalate	50	ND	ND	ND	0.80 J B	0.46 J B	ND	ND	0.59 J B	0.39 J B	0.51 J B	0.69 J B	ND	ND	ND	ND	ND	ND	0.27 J B	0.33 J B	ND	ND	ND	ND	ND	ND	ND
Caprolactam	NS	2.3 J	7.0 J	ND	ND	ND	ND	ND	ND	1.7 J	ND	2.5 J	ND	ND	ND	ND	1.6 J	1.3 J	ND	ND	ND	ND	1.1 J B	3.0 J B	ND	ND	ND
Chrysene	0.002	ND	ND	ND	0.24	ND	ND	ND	ND	ND	ND	0.32 J	ND	ND	ND	ND	1.9 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethyl phthalate	5	0.64 J B	ND	ND	ND	ND	ND	ND	ND	0.50 J B	ND	ND	ND	ND	ND	ND	ND	ND	0.39 J B	ND	ND	0.47 J	ND	0.59 J	ND	ND	ND
Di-n-butyl phthalate	50	3.2 J B	6.1 J B	4.6 J B	4.3 B	ND	ND	ND	4.2 B	4.0 B	9.2 B	4.3 B	12 B	4.3 B	93 B	5.1 B	4.9 B	3.3 B	3.0 B	4.8 B	3.9 B	3.1 B	1.9 B	3.4 B	ND	ND	ND
Di-n-octyl phthalate	5	ND	ND	ND	0.50 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	50	ND	ND	ND	0.13 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	50	ND	ND	ND	ND	ND	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.002	ND	ND	ND	0.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	10	ND	ND	ND	31	3.9	39	88	25	ND	46	76	5.8	16	7.4	18	0.48 J	0.14 J	0.14 J	31	17	0.26	0.3	0.4	ND	ND	ND
Phenanthrene	50	ND	ND	ND	ND	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	1*	0.72 J	ND	ND	ND	ND	ND	ND	ND	0.42 J	ND	ND	ND	ND	35	ND	ND	ND	0.56 J	ND	ND	1.4	ND	1.6	ND	ND	ND
Pyrene	50	ND	ND	ND	0.11 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Bold- Analyte was detected in laboratory analysis
 Highlight- Analyte was detected above the NYSDEC AWQS or Guidance Value
 *Sum of all Phenols
 NS- No Standard
 ND- Not detected above MDL
 B-Compound detected in laboratory control blank.
 J - Result is estimated, detection was below the RL but above the MDL

Table 4
Pesticides Results
Korkay July 2014 Groundwater Investigation

Sample Location	NYSDEC AWQS & GV ug/L	Off Site East	On-Site												Off Site West			Off Site Right of Way South				Off Site North			
		GW-1 7/7/2014 1:18 PM	GW-2 7/7/2014 3:00 PM	GW-3 7/7/2014 4:00 PM	GW-4 7/7/2014 4:30 PM	GW-5 7/8/2014 7:45 AM	GW-6 7/8/2014 8:10 AM	GW-7 7/8/2014 8:40 AM	GW-8 7/8/2014 9:00 AM	GW-9 7/8/2014 10:00 AM	GW-13 7/8/2014 1:45 PM	GW-14 7/8/2014 2:45 PM	GW-15 7/8/2014 4:30 PM	GW-16 7/9/2014 7:45 AM	GW-10 7/8/2014 10:45 AM	GW-11 7/8/2014 11:00 AM	GW-12 7/8/2014 11:35 AM	GW-17 7/9/2014 8:30 AM	GW-18 7/9/2014 8:55 AM	GW-19 7/9/2014 9:20 AM	GW-20 7/9/2014 9:45 AM	GW-21 7/9/2014 10:25 AM	GW-22 7/9/2014 10:50 AM	GW-23 7/9/2014 11:30 AM	
Pesticides ug/L																									
4,4'-DDD	0.3	0.52	0.14 J	0.093 J	0.012 J	0.10 J	0.071 J	0.88	0.050 J	0.45	0.042 J	0.092 J	0.42	0.19	0.41 J	ND	0.036 J	0.76	0.11	0.27	0.21 J	0.073	0.12	0.023 J	
4,4'-DDE	0.2	0.11 J	0.13 J	ND	0.021 J	ND	ND	0.39 J	ND	0.067	0.043 J	0.057 J	0.16 J	0.062	0.50 J	0.24	ND	0.14	0.026 J	0.067	ND	0.026 J	0.025 J	ND	
4,4'-DDT	0.2	ND	ND	ND	ND	ND	ND	0.26 J	ND	ND	ND	0.10 J	ND	ND	ND	0.013 J	0.015 J	ND	0.035 J	ND	0.021 J	ND	ND	ND	
Aldrin	Non-Detect	ND	ND	ND	0.028 J	0.056 J	0.059 J	ND	ND	ND	0.036 J	0.18 J	ND	ND	ND	0.10 J	0.043 J	ND	ND	ND	ND	ND	ND	ND	
alpha-BHC	0.01	ND	ND	0.047 J B	0.061 B	0.058 J B	ND	0.48 J B	0.088 J B	0.010 J B	ND	ND	ND	0.011 J B	0.23 J B	0.096 J B	ND	0.0089 J B	0.0080 J B	ND	ND	0.022 J	0.012 J	ND	
alpha-Chlordane	0.05**	0.20 J	1.6	0.78	0.44	0.36	1.1	3	ND	ND	0.12	ND	ND	0.018 J	6.2	1.7	0.016 J	ND	ND	0.014 J	ND	0.21	0.014 J	ND	
beta-BHC	0.04	ND	ND	ND	ND	ND	ND	0.36 J	ND	ND	0.066	0.13 J	ND	ND	ND	ND	ND	ND	ND	0.041 J	ND	ND	ND	ND	
Dieldrin	0.004	ND	ND	ND	0.077	ND	0.083 J	0.18 J	ND	ND	0.026 J	0.059 J	ND	0.027 J	ND	0.18 J	ND	ND	ND	ND	ND	0.032 J	ND	ND	
Endosulfan I	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.032 J	ND	ND	ND	ND	ND	ND	ND	0.038 J	ND	ND	
Endosulfan II	NS	ND	ND	ND	0.014 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.095 J	ND	ND	ND	ND	ND	ND	0.023 J	ND	ND	
Endosulfan sulfate	NS	ND	ND	ND	ND	ND	ND	ND	ND	0.026 J	ND	ND	ND	0.072	ND	0.14 J	ND	ND	ND	0.028 J	ND	0.020 J	0.016 J	ND	
Endrin	Non-Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.023 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Endrin aldehyde	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.083 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Endrin ketone	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.025 J	ND	ND	ND	ND	ND	ND	ND	ND	0.027 J	ND	ND	ND	ND	
delta-BHC	0.04	ND	ND	ND	ND	ND	ND	0.48 J	ND	ND	0.13	0.060 J	ND	ND	ND	ND	ND	ND	ND	0.011 J	ND	ND	ND	ND	
gamma-BHC (Lindane)	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.015 J	0.072 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
gamma-Chlordane	0.05**	0.12 J	0.72	0.23 J	0.18	0.13 J	0.67	2.2	0.10 J	0.027 J	0.051	ND	ND	0.034 J	3.1	1.4	ND	0.021 J	0.018 J	0.020 J	ND	0.23	0.035 J	ND	
Heptachlor	0.04	ND	ND	ND	ND	ND	0.12 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Heptachlor epoxide	0.03	ND	ND	ND	ND	ND	0.91	1.7	ND	ND	ND	ND	ND	ND	0.45 J	0.98	ND	ND	ND	ND	0.016 J	ND	ND	ND	
Methoxychlor	35	ND	ND	ND	0.23	ND	ND	ND	ND	ND	0.15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Toxaphene	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

Bold- Analyte was detected in laboratory analysis

Highlight- Analyte was detected above the NYSDEC AWQS or Guidance Value

** Sum of all Chlordanes

NS- No Standard

ND- Not detected above MDL

B-Compound detected

J - Result is estimated, detection was below the RL but above the MDL

Table 5
VOC Results
Korkay August 2015 Groundwater Investigation

Sample Location		Off Site South							Off Site West						
Sample ID	NYSDEC AWQS & GV ug/L	GW-24 8/3/2015 1:00 PM	GW-25 8/3/2015 2:00 PM	GW-29 8/4/2015 8:40 AM	GW-30 8/4/2015 9:20 AM	GW-31 8/4/2015 10:00 AM	GW-32 8/4/2015 10:30 AM	GW-26 8/3/2015 3:00 PM	GW-27 8/3/2015 3:30 PM	GW-28 8/3/2015 4:06 PM	GW-33 8/4/2015 11:25 AM	GW-34 8/4/2015 12:10 PM	GW-35 8/4/2015 1:40 PM	GW-36 8/4/2015 2:10 PM	GW-37 8/4/2015 3:05 PM
VOCs ug/L															
STARS List VOCs (Petroleum)															
1,2,4-Trimethylbenzene	5	ND	5.4	250	450	130	ND	110	55	59	ND	ND	ND	21	5.4
1,3,5-Trimethylbenzene	5	ND	ND	62	97	25	ND	34	ND	ND	ND	ND	ND	3.8	ND
Ethylbenzene	5	ND	ND	67	110	42	17	4.4 J	13	9.0 J	ND	ND	ND	2.1	ND
n-Propylbenzene	5	ND	3.8 J	38	72	32	7	18	7.5 J	7.0 J	ND	ND	ND	5.9	2.5
n-Butylbenzene	5	ND	5.2	19	59	29	4.9 J	38	6.8 J	ND	ND	ND	ND	4.4	2.5
sec-Butylbenzene	5	ND	7	13	40	25	4.8 J	23	ND	ND	ND	ND	ND	2.7	7.8
tert-Butylbenzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.85 J
Isopropylbenzene	5	ND	ND	21	39	20	6	6.7	ND	ND	ND	ND	ND	2.1	ND
Toluene	5	ND	ND	7.4 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	5	ND	ND	12	16	4.6 J	ND	19	ND	ND	ND	ND	ND	2.9	1.1
o-Xylene	5	ND	ND	100	180	44	ND	5.9	31	ND	ND	ND	ND	3.8	ND
m,p-Xylene	5	ND	ND	180	150	26	ND	6.7	10	ND	ND	ND	ND	3.9	ND
Xylenes, Total	5	ND	ND	280	330	70	ND	15	41	ND	ND	ND	ND	7.7	ND
Naphthalene	10	ND	ND	23	12	9.3	ND	6.5	ND	ND	ND	ND	ND	9.4	ND
TCL List VOCs Non-STARS List															
1,1-Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	3	ND	10	18	20	11	7.7	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.5 J	ND
Bromodichloromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.68 J ^	ND
Chloroform	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4	1.7
cis-1,2-Dichloroethene	5	ND	ND	14	19	9.5	6.1	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NS	ND	ND	ND	3.4 J	1.9 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	NS	ND	3.0 J	5.2 J	12	7.2	1.7 J	6	1.6 J	ND	ND	ND	ND	1.2	0.41 J
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.60 J	ND	ND
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Bold - Analyte was detected in laboratory analysis

NYSDEC AWQS or Guidance Value

NS- No Standard

ND- Not detected above MDL

J - Result is estimated, detection was below the RL but above the MDL

Table 6
SVOC Results
Korkay August 2015 Groundwater Investigation

Sample Location		Off Site South						Off Site West							
Sample ID	NYSDEC	GW-24	GW-25	GW-29	GW-30	GW-31	GW-32	GW-26	GW-27	GW-28	GW-33	GW-34	GW-35	GW-36	GW-37
Sample Date	AWQS & GV	8/3/2015	8/3/2015	8/4/2015	8/4/2015	8/4/2015	8/4/2015	8/3/2015	8/3/2015	8/3/2015	8/4/2015	8/4/2015	8/4/2015	8/4/2015	8/4/2015
Sample Time	ug/L	1:00 PM	2:00 PM	8:40 AM	9:20 AM	10:00 AM	10:30 AM	3:00 PM	3:30 PM	4:06 PM	11:25 AM	12:10 PM	1:40 PM	2:10 PM	3:05 PM
SVOCs ug/L															
2,4-Dimethylphenol	1*	ND	ND	4.5 J	2.3 J	0.64 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	NS	ND	ND	5.9	0.92 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	1*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetophenone	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzaldehyde	NS	0.57 JB	ND	ND	20 B	9.6 B	0.54 JB	ND	ND	ND	0.40 JB	0.59 JB	0.52 JB	3.8 JB	0.57 JB
Benzo(a)anthracene	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	Non-Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Biphenyl	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl) phthalate	5	2.1 J	19	ND	3.9 J	2.1 J	ND	2.8 J	ND	ND	ND	ND	ND	3.3 J	3.6 J
Butyl benzyl phthalate	50	0.59 J	0.62 J	ND	0.43 J	0.61 J	0.55 J	0.59 J	0.56 J	ND	ND	0.45 J	ND	ND	ND
Caprolactam	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethyl phthalate	5	4.4 J	0.76 J	0.33 J	0.47 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butyl phthalate	50	2.7 J	ND	0.94 J	1.9 J	1.0 J	0.97 J	ND	0.89 J	0.64 J	ND	0.40 J	0.54 J	1.3 J	0.62 J
Di-n-octyl phthalate	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	10	ND	ND	21	8	5.4	ND	2.2 J	ND	ND	ND	ND	ND	7.1	ND
Phenanthrene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	1*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Bold- Analyte was detected in laboratory analysis
 Highlight- Analyte was detected above the NYSDEC AWQS or Guidance Value
 *Sum of all Phenols
 NS- No Standard
 ND- Not detected above MDL
 B-Compound detected in laboratory control blank.
 J - Result is estimated, detection was below the RL but above the MDL

Table 7
Pesticides Results
Korkay August 2015 Groundwater Investigation

Sample Location	NYSDEC	Off Site South						Off Site West							
Sample ID	AWQS & GV	GW-24	GW-25	GW-29	GW-30	GW-31	GW-32	GW-26	GW-27	GW-28	GW-33	GW-34	GW-35	GW-36	GW-37
Sample Date	ug/L	8/3/2015	8/3/2015	8/4/2015	8/4/2015	8/4/2015	8/4/2015	8/3/2015	8/3/2015	8/3/2015	8/4/2015	8/4/2015	8/4/2015	8/4/2015	8/4/2015
Sample Time		1:00 PM	2:00 PM	8:40 AM	9:20 AM	10:00 AM	10:30 AM	3:00 PM	3:30 PM	4:06 PM	11:25 AM	12:10 PM	1:40 PM	2:10 PM	3:05 PM
Pesticides ug/L															
4,4'-DDD	0.3	0.033 J	0.017 J	ND	0.05 J	0.015 J	0.063 J	0.0094 J	ND	ND	0.042 J	ND	0.018 J	ND	0.013 J
4,4'-DDE	0.2	0.014 J	0.020 J	ND	ND	0.026 J	0.080 J	0.012 J	0.017 J	ND	0.033 J	0.073 J	0.033 J	0.029 J	0.026 J
4,4'-DDT	0.2	ND	ND	ND	ND	0.032 J	ND	0.023 J	0.023 J	0.19 J	0.033 J	0.073 J	0.025 J	0.025 J	0.025 J
Aldrin	Non-Detect	ND	0.0080 J	ND	ND	0.048 J	ND	0.032 J	0.040 J	ND	0.014 J	ND	ND	0.013 J	ND
alpha-BHC	0.01	0.014 J	ND	0.027 J	ND	ND	0.016 J	ND	0.026 J	ND	0.023 J	ND	ND	ND	ND
alpha-Chlordane	0.05**	ND	ND	0.017 J	ND	ND	ND	0.04 J	0.31	ND	0.015 J	ND	ND	0.020 J	ND
beta-BHC	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin	0.004	ND	ND	ND	ND	0.042 J	ND	0.015 J	0.041 J	ND	ND	ND	ND	ND	ND
Endosulfan I	NS	ND	ND	ND	ND	ND	ND	0.18	0.17	ND	0.040 J	ND	ND	ND	ND
Endosulfan II	NS	ND	ND	ND	ND	0.027 J	ND	ND	0.036 J	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	NS	0.023 J	ND	ND	ND	ND	ND	0.042 J	ND	ND	ND	ND	ND	ND	ND
Endrin	Non-Detect	ND	ND	ND	ND	ND	ND	0.014 J	0.013 J	ND	ND	ND	ND	ND	ND
Endrin aldehyde	5	ND	0.026 J	0.028 J	ND	0.037 J	0.043 J	0.045 J	ND	ND	ND	0.069 J	0.023 J	ND	ND
Endrin ketone	5	ND	ND	ND	0.11 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC	0.04	ND	ND	0.011 J	ND	ND	ND	ND	0.017 J	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	0.05	ND	ND	ND	ND	0.0094 J	ND	0.0092 J	0.021 J	ND	ND	ND	ND	ND	ND
gamma-Chlordane	0.05**	ND	ND	ND	ND	ND	ND	0.020 J	0.18	ND	ND	ND	ND	ND	ND
Heptachlor	0.04	0.025 J	ND	ND	ND	ND	ND	ND	0.049	ND	0.017 J	ND	ND	ND	ND
Heptachlor epoxide	0.03	ND	ND	ND	ND	ND	ND	0.052	ND	ND	ND	ND	0.017 J	ND	ND
Methoxychlor	35	0.025 J	ND	0.042 J	ND	0.16	ND	0.053	ND	ND	0.051	ND	ND	0.058	ND
Toxaphene	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Bold- Analyte was detected in laboratory analysis

Highlight- Analyte was detected above the NYSDEC AWQS or Guidance Value

** Sum of all Chlordanes

NS- No Standard

ND- Not detected above MDL

B-Compound detected

J - Result is estimated, detection was below the RL but above the MDL

Appendix G
Excavation Work Plan (EWP)

APPENDIX G – EXCAVATION WORK PLAN (EWP)

H-1 NOTIFICATION

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

Table 1: Notifications*

Payson Long	518-402-9813; payson.long@dec.ny.gov
Joseph Zalewski, Region 5 Engineer	(518) 897-1241; joseph.zalewski@dec.ny.gov
Russ Huyck, Region 5 Spills Engineer	(518) 897-1241; russell.Huyck@dec.ny.gov
Walter Howard, AECOM	518-951-2387/ walter.howard@aecom.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 and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix I of this SMP;
- Identification of disposal facilities for potential waste streams;

- A description and a map of the transport routes to be used for the off-site transport of all materials in compliance with the provisions of Section H-5; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

H-2 SOIL SCREENING METHODS

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

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

H-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.

H-4 MATERIALS EXCAVATION AND LOAD-OUT

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

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

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

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

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

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

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

H-5 MATERIALS TRANSPORT OFF-SITE

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

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

Truck transport routes shall be provided as an element of the Notification (Section H-1). All trucks loaded with site materials will exit the vicinity of the site using only the approved truck routes. The most appropriate route shall be established, taking into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks

entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport; and (g) community input.

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

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

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

H-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

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

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

H-7 MATERIALS REUSE ON-SITE

Materials reuse on-site, if necessary and appropriate will comply with the requirements of NYSDEC DER-10 Section 5.4(e)4. Procedures for determining if reuse is appropriate will include stockpiling the material on site, analyzing samples of the stockpiled material and comparing the analytical

results to the Unrestricted Use Soil Cleanup Objectives (SCOs) from 6 NYCRR Subpart 375-6 (December 14, 2006). Material stockpiles may be located anywhere within the Site boundary, as shown in Figure 2 of this SMP. All stockpiles will be constructed and maintained following the provisions of Section H-3 of this EWP. The number of samples that will be collected to test the stockpiled material for reuse will comply with NYSDEC DER-10 Section 5.4(e)10. Samples will be sent to a NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory. All samples will be analyzed for volatile organic compounds (VOCs) using EPA Method 8260b, semi-volatile organic compounds (SVOCs) using EPA Method 8270c, and organopesticides using EPA Method 8081a. The materials may be reused if the results demonstrate compliance with the SCOs. If analytical concentrations are above the SCOs, a request may be made to NYSDEC to approve reuse of the material, if placed below the soil cover.

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

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

H-8 FLUIDS MANAGEMENT

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

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

H-9 SOIL COVER RESTORATION

After the completion of soil removal and any other invasive activities the soil cover will be restored in a manner that complies with the existing cover. The existing soil cover is comprised of a minimum of 24

inches of clean soil. A demarcation layer, consisting of orange snow fencing material, white geotextile or equivalent material, etc. will be placed to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of soil cover changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

H-10 BACKFILL FROM OFF-SITE SOURCES

The requirements for backfill used at the site will be consistent with the requirements provided in DER-10 Section 5.4(e). Details regarding the source(s) of backfill materials, source area background checks, confirmation of DOT Certification, etc., will be provided with the Notification (Section H-1).

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

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are the 6 NYCRR Subpart 375-6 Unrestricted Use SCOs. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

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

H-11 STORMWATER POLLUTION PREVENTION

Stormwater pollution prevention procedures will be determined based on the nature and size of the excavation to be conducted. A summary of the Stormwater Pollution Prevention Plan (SWPP) that conforms to the requirements of the NYSDEC Division of Water guidelines and NYS regulations will be provided with the excavation Notification (Section H-1). Generic procedures that will be incorporated into the SWPP include:

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.

H-12 EXCAVATION CONTINGENCY PLAN

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

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

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

H-16 OTHER NUISANCES

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

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

Appendix H
HASP and CAMP



Prepared for:
Superfund Standby Program
NYSDEC
Albany, NY

Prepared by:
AECOM
Latham, NY
July 2015

HEALTH AND SAFETY PLAN (HASP)

Korkay, Inc. Site
70 West Main Street
Broadalbin, NY 12025
Work Assignment No. D00445-20

Prepared for:

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by:

AECOM Technical Services Northeast, Inc.
40 British American Boulevard
Latham, New York 12110

Health and Safety Plan Expiration Date: August 2016

Project No: 60273289

Project Health and Safety Plan

This project Health and Safety Plan (HASP) was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the Former Kenco Chemical Company site. This HASP has been written for the exclusive use of AECOM, its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

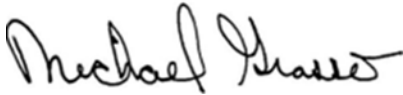
Prepared by:



Walter O. Howard
Project Manager
518-951-2387

July 30, 2015
Date

Concurrence by:



Michael Grasso, CIH
Operations Health and Safety Manager
607-201-6737

July 30, 2015
Date

Executive Summary

The purpose of this Health and Safety Plan (HASP) is to address health and safety concerns related to AECOM managed activities at the Korkay Inc, site, located at 70 West Main Street in Broadalbin, NY. The specific roles, responsibilities, authority, and requirements as they pertain to the safety of employees and the scope of services are discussed herein. The document is intended to identify known potential hazards and facilitate communication and control measures to prevent injury or harm. Additionally, provisions to control the potential for environmental impact from these activities are included where applicable.

SUMMARY TABLE					
AECOM SOW		<p>AECOM will be performing the following field activities:</p> <p>Groundwater Investigation: soil boring oversight, monitoring well installation oversight, monitoring well development and sampling, and oversight of land surveying and geophysical surveying contractors.</p> <p>ISCO Injection: Oversight of AECOM's subcontractor, Regensis, Inc., who will conduct In-Situ Chemical Oxidation (ISCO) injections of Persulfox® and ORC Advanced® to treat contaminated groundwater.</p>			
Driller SOW (subcontractor)		The driller (Parratt-Wolff) will be drilling approximately 15 soil borings to an approximate depth of 15 to 25 feet below grade using a direct push rig equipped with a Geoprobe SP-15 sampler with a four foot screen. The driller will be continuously sampling borehole soils to support soil classification and screen placement.			
ISCO SOW (subcontracted)		The ISCO injection subcontractor (Regensis) will mobilize drilling equipment, equipment, ISCO product and supplies to the site. Regensis will advance probes using a direct push rig to depths of 15 to 25 feet below grade. Regensis will conduct injection of the ISCO products to subsurface groundwater through the direct-push probes.			
Geophysical Surveyor SOW (subcontractor)		AGS will be performing a non-intrusive subsurface survey to clear monitoring well locations prior to drilling using ground-penetration radar and electromagnetic techniques.			
Surveyor SOW (subcontractor)		The land surveyor (SY Kim) will be locating newly installed wells during a one-day field visit.			
PRIMARY PHYSICAL HAZARDS					
x	Buried Utilities		Traffic Control	x	Electrical Hazards
x	Overhead Utilities	x	Slips, Trips, Falls, Protruding Objects	x	Biological Hazards
x	Heavy Equipment	x	Manual Lifting	x	Working adjacent to Railway
x	Pinch/Cut Hazards	x	Cold/Heat Stress	x	Inclement weather
PRIMARY PHYSICAL HAZARDS					
x	Excessive Noise	x	Splash Hazards		Unfamiliar Spaces
CHEMICAL HAZARDS, MONITORING, ACTION LEVELS					
CONTAMINANTS OF CONCERN		MONITORING		ACTION LEVELS	
Chlorinated Solvents (Total VOCs by PID)		MiniRae 2000 PID or equivalent with 10.6 eV bulb		At 10 ppm above background stop work, evaluate control measures, and implement corrective action.	

All staff are bound by the provisions of this HASP and are required to participate in a preliminary project safety meeting to familiarize them with the anticipated hazards and respective onsite controls. The discussion will cover the entire HASP subject matter, putting emphasis on critical elements of the plan; such as the emergency response procedures, personal protective equipment, site control strategies, and monitoring requirements. In addition, daily tailgate safety meetings will be held to discuss: the anticipated scope of work, required controls, identify new hazards and controls, incident reporting, review the results of inspections, any lessons learned or concerns from the previous day.

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1.0 Introduction

This Health and Safety Plan (HASP) (including Attachments A-E) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the Korkay, Inc. site, located at 70 West Main Street in Broadalbin, New York. This HASP also identifies chemical and physical hazards known to be associated with the AECOM-managed activities addressed in this document.

HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions, which may occur during field operations.

1.1 General

The provisions of this HASP are mandatory for all AECOM personnel engaged in fieldwork associated with the environmental services being conducted at the subject site. A copy of this HASP, any applicable HASP Supplements and the AECOM's North America Safety, Health, and Environmental (SH&E) Procedures and Manual shall be accessible on site and available for review at all times. Record keeping will be maintained in accordance with this HASP and the applicable Standard Operating Procedures (SOPs). In the event of a conflict between this HASP, the SOPs and federal, provincial, state, and local regulations, workers shall follow the most stringent/protective requirements. Concurrence with the provisions of this HASP is mandatory for all personnel at the site covered by this HASP and must be signed on the acknowledgement page.

1.2 Project Policy Statement

AECOM is committed to protecting the safety and health of our employees and meeting our obligations with respect to the protection of others affected by our activities. We are also committed to protecting and preserving the natural environment in which we operate. The safety of persons and property is of vital importance to the success of this project and accident prevention measures shall be taken toward the avoidance of needless waste and loss. It shall be the policy of this project that all operations be conducted safely. Onsite supervisors are responsible for those they supervise by maintaining a safe and healthy working environment in their areas of responsibility, and by fairly and uniformly enforcing safety and health rules and requirements for all project personnel. Subcontractors shall comply with the requirements of this HASP, provisions contained within the contract document and all applicable rules, requirements and health, safety and environmental regulations. All practical measures shall be taken to promote safety and maintain a safe place to work. Contractors are wholly responsible for the prevention of accidents on work under their direction and shall be responsible for thorough safety and loss control programs and the execution of their own safety plans for the protection of workers.

1.3 References

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

- Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), *Occupational Safety and Health Standards* (with special attention to Section 120, *Hazardous Waste Operations and Emergency Response*).
- Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), *Safety and Health Regulations for Construction*.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, *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 Corporate Safety Program requirements as specified in AECOM's North America Safety, Health, and Environmental (SH&E) Procedures and Manual.

2.0 Site Information and Scope of Work

AECOM will conduct environmental services at the Korkay, Inc site. Work will be performed in accordance with the applicable Work Assignment Scope of Work (SOW) and associated Project Work Plan. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the project site, and the work procedures to be performed. The Project Work Plan prepared by AECOM as a companion document to this HASP provides more detail concerning both site history and planned work operations.

2.1 Site Information

This section provides a general description and historical information associated with the site.

2.1.1 General Description

Korkay, Incorporated (Korkay) located in Broadalbin, NY, was a supplier of detergents, solvents, and degreasers to the automotive industry from 1969 to 1980. Korkay purchased bulk quantities of chemicals that were stored on-site for repackaging and/or blending into commercial products including automobile wax, and hand cleaners. In addition to the commercial products being produced, Korkay also operated as a drum reclamation facility. Drums were accepted containing a variety and quantity of chemicals that remains undetermined. The drums were emptied of any remaining chemicals, washed, rinsed and relined. This process was conducted without appropriate containment of the chemicals, and chemical laden rinsate being discharged through the facilities septic system or directly to the ground surface. The NYSDEC and NYSDOH inspected the Site in 1979 and documented the occurrence of these activities. In 1980, Korkay installed a 4,000 gallon above ground storage tank (AST) to appropriately contain the residual chemicals and rinsate generated from drum reclamation. Reports and Site documentation indicate that the drums contained acetone, isopropyl alcohol, degreasers, and perfumes as well as other chemicals.

2.1.2 Site Background/History and Previous Investigations

Korkay was a supplier of detergents, solvents, and degreasers to the automotive industry from 1969 to 1980. Korkay purchased bulk quantities of chemicals that were stored on-site for repackaging and/or blending into commercial products including automobile wax, and hand cleaners. In addition to the commercial products being produced, Korkay also operated as a drum reclamation facility. Drums were accepted containing a variety and quantity of chemicals that remains undetermined. The drums were emptied of any remaining chemicals, washed, rinsed and relined. This process was conducted without appropriate containment of the chemicals, and chemical laden rinsate being discharged through the facilities septic system or directly to the ground surface. The NYSDEC and NYSDOH inspected the Site in 1979 and documented the occurrence of these activities. In 1980, Korkay installed a 4,000 gallon above ground storage tank (AST) to appropriately contain the residual chemicals and rinsate generated from drum reclamation. Reports and Site documentation indicate that the drums contained acetone, isopropyl alcohol, degreasers, and perfumes as well as other chemicals.

In 1998 a phase II investigation was conducted. Multimedia sampling identified several inorganic and volatile organic compounds (VOCs) in groundwater at concentrations exceeding applicable standards. Subsequently, a remedial investigation (RI) was completed, followed by a feasibility study (FS), (Final Phase I and II FS, Camp Dresser and McKee 1995) to determine appropriate remedial activities to be conducted in order to address the contamination present at the site.

A Record of Decision (ROD) was entered by the NYSDEC in March 1996 which documented the site cleanup objectives and requirements for the remedial activities to be conducted. In August 1997, a remedial action was conducted at the site which included demolition of a building, and excavation and disposal of contaminated soils. In November 1998, a soil vapor extraction/air sparging (SVE/AS) system was constructed and put into operation in order to address the residual soil contamination. The SVE system was operated intermittently until 2003, when confirmatory soil sampling indicated that the soil cleanup objectives had been achieved.

In 2007, AECOM entered into Work Assignment No. D004445-20 of the State Superfund Standby Contract with the New York State Department of Environmental Conservation (NYSDEC). This work assignment included the generation of a Remedial System Operation (RSO) report, continued environmental sampling (groundwater monitoring and soils), site maintenance and reporting. In August 2007 soil borings were installed within the SVE/AS treatment area to collect soil data in support of the RSO. The RSO determined that the SVE/AS system was effective in reducing VOC concentrations in the vadose zone soils closest to the extraction wells (VEWs), but that "dead zones" existed in the areas between the VEWs and that VOC concentrations had not been significantly reduced in the saturated soils. A focused feasibility study was conducted as part of the RSO and the recommended remedial alternative was excavation and offsite disposal of the soils exceeding cleanup standards. Based on the available data during the preparation of the RSO, the area of impacted soil was assumed to be 60-feet (ft) by 60-ft as the actual extent of contaminated soil had not been delineated as part of the August 2007 sampling event. The RSO estimated about 1,200 tons of soil would be excavated and sent offsite for disposal.

At the request of the NYSDEC 88 soil borings were installed in March 2010 to delineate the 60-ft by 60-ft excavation area proposed by the RSO. However, the borings completed at the edge of that area appeared to be impacted and the NYSDEC asked AECOM to complete additional borings to further delineate the nature and extent of soil impacts beyond the 60-ft by 60-ft area. In March 2010 AECOM completed 28 additional borings and conducted VOC and pesticide sampling activities. Results from these sampling activities indicated that soil contamination was more widespread than initially thought, about 20,500 square ft, requiring a much larger volume of soil to be excavated and removed from the Site for disposal. In order to avoid conducting a large scale excavation *in situ* remedies began to be considered for the Site at this time.

In 2014, under the NYS Superfund Standby Contract Work Assignment number D007626-20, AECOM conducted a groundwater direct push investigation to further delineate and characterize the dissolved phase groundwater impacts, and to collect soil samples for analysis of natural oxidant demand (NOD) to evaluate the effectiveness of using an oxidant for *in situ* remediation of contaminated soil and groundwater at the Site. The results of the July 2014 activities indicated that the extent of the dissolved phase groundwater impacts appeared to be greater than previous investigations and monitoring had suggested and that *in situ* chemical oxidation (ISCO) would be a favorable remedy at the site. Consequently, ISCO was selected as the remedy to be implemented for source zone remediation of the onsite saturated zone.

2.2 Scope of Work

The scope of work for this project includes the completion of drilling and groundwater monitoring well installation and groundwater sampling. In addition, the scope of work includes the performance of an ISCO injection program by an AECOM subcontractor to treat groundwater in the contaminant plume.

2.2.1 Mobilization/Demobilization

Mobilization and demobilization represent limited pre and post-task activities. These activities include driving to and from the site; initial site preparations, such as work station and equipment setup, and post-work activities, such as general housekeeping. This activity does not represent any intrusive activities.

2.2.2 Utility Clearance

This task includes verification of utility mark-outs and presence of the clear dig permits (on-site). All utility clearance shall be obtained by the authorizing authority for the subject site. In addition to one-call clearance, a private utility location contractor (AGS) will be used to pre-clear boreholes. Temporary Boring and Well Installation Oversight

AECOM personnel will be performing oversight for the installation of temporary borings installed using a Geo-probe rig and monitoring wells using hollow-stem auger (HSA) techniques. A drilling subcontractor (Parratt-Wolff) will be utilized for the installation of monitoring wells (2-inch PVC) to a predetermined depth. The major activities involved with installation of a monitoring well or a temporary boring are as follows:

- Pre-sampling event notifications and approval
- Set-up for boring/well installation
- Monitor air quality in the workers breathing zone
- Log soils and screen with a PID
- Administrative activities

2.2.3 Groundwater Sampling

This activity will include the collection of groundwater samples from the existing monitoring well network, temporary Geo-probe points, and newly installed monitoring wells. Groundwater samples will be collected using inertial pumps and tubing. The major activities involved with collecting groundwater samples from the site and surrounding properties include the following:

- Pre-sampling event notifications and approval
- Set-up for sampling activities
- Purge wells
- Collect groundwater samples
- Sample prep and sample shipping

- Administrative activities

2.2.4 Investigative-Derived Waste (IDW) Management

IDW will be collected and categorized as non-hazardous or hazardous. Liquids (purge water, decontamination water) generated during site activities will be processed through the on-site treatment system. Soil cuttings will be drummed and tested for characterization.

2.2.5 Equipment Decontamination

AECOM and subcontractor personnel will perform decontamination of equipment used to perform work within controlled work areas.

Before any drilling is begun, and at the completion of drilling, the drilling subcontractor shall decontaminate drilling equipment that will be used on site. The drilling subcontractor shall provide a high-pressure steam cleaner for decontamination of all downhole drilling equipment. The drill rig shall be steam-cleaned between each location. Soil sampling equipment shall be decontaminated between each use, using a phosphate free detergent and potable water in accordance with ASTM D 5088. The drilling subcontractor shall construct a temporary decontamination pad to contain all decontamination water generated during decontamination of drill rigs and tools.

Pre-cleaned and dedicated sampling materials/equipment will be used to collect the soil and groundwater samples for laboratory analysis. After the samples are collected, any disposable, or one-time use equipment (tubing, bladders) will be placed in a plastic bag for disposal per accordance with the paragraph above. Non-disposable sampling and drilling equipment that contacted the soil and/or groundwater will be decontaminated between each sampling location. Gross sediments and/or contamination will first be removed from the sampling and drilling equipment. The equipment will then be washed with DI water and Alconox detergent and then rinsed with DI water.

2.2.6 Survey

AECOM will subcontract a NYS Licensed Land Surveyor to survey the locations of new monitoring wells.

2.2.7 Additional Work Operations

Operations at the site may require additional tasks not identified in this section or addressed in Attachment A, THAs. Before performing any task not covered in this HASP a THA must be prepared, and approved by the Safety Professional.

3.0 Hazard Assessment (Safety)

3.1 Physical Hazards

The following physical hazards are anticipated to be present on the site. Additional hazards may be noted on the THA's developed for the individual tasks.

3.1.1 Drilling Operations

AECOM will be overseeing the drilling operations which include hollow-stem, rotary and/or direct push drilling. The hazards associated with drill rigs are caught by or between moving or rotating parts, struck by the movement of the drill rig or material being handled, contact with above ground and below ground utilities, and slips trips and falls on slippery surfaces, hose lines, and drilling material.

AECOM employees are not authorized to operate any type of mobile drill rig, and shall stay out of the path of travel of a drill rig and away from rotating and moving parts of a drill rig when it is operating. Specific requirements for drilling and boring can be found in SOP S3NA-405-PR1 Drilling, Boring, and Direct Push Probing.

Prior to drilling it is important and the law that underground utilities be identified by calling 811 to have buried utilities identified and located. It is also important to identify aboveground utilities, such as electrical lines, cable television or telephone wires that may be in the vicinity of the proposed bore hole or path of travel of the drill rig. The minimum safe clearance distance from above ground utilities such as electrical wires is 10 feet. Drill rig precautions are as follows:

- The drill rig and components shall be inspected daily by the drill rig operator;
- Except for the driller and helper, all personnel will stay away (e.g., 15+ ft) from the rig when it is operating unless it is necessary to be near it;
- If required to approach the drill rig for the collection of samples or down hole observations the drill rig must be taken out of gear to stop movement of boring tools. Only then can you approach the rig;
- Loose fitting clothing must be secured when in the vicinity of drilling operations;
- The drill rig operator shall perform a visual safety of the drill rig daily and after it has been moved to a new location;
- Cell phone, text messaging or the use of personal headsets is prohibited when working on or near a drill rig;
- Borehole will be immediately backfilled upon completion of work;
- If a borehole is to be left open, the opening will be marked with "Caution-Open Trench" tape. If necessary, metal plates will be placed over the borehole to permit vehicular crossing; and
- As necessary hearing protection shall be used when near drilling operations.

3.1.2 Electrical Hazards

AECOM employees are not authorized to work on electrical equipment or near any part of an electrical circuit unless they are protected against shock by guarding or by de-energizing and grounding the circuit. Information on general electrical safety can be found in SOP S3NA-302-PR Electrical, General and information on hazard energy control (lockout) is found in SOP S3NA-410-PR Hazardous Energy Control.

Potential electrical hazards include electric shock, electrocution, burns, fires, and explosion. Electrical cords used to carry electrical power pose a trip and fall hazards. The use of portable generator poses an electrical hazard and also the hazard associated with exposure to carbon monoxide.

To prevent potential electrical incidents the following basic electrical practices must be followed at all times while working on this project.

- Use ground fault circuit interrupters (GFCIs) when using electrical powered tools/equipment. GFCIs prevent electrical shock by detecting the loss of electricity from a power cord and/or electrical device.
- Temporary electrical cords must be rated for extra hard usage or hard usage and must be of the three-wire type with a grounding pin and a grounding receptacle. Look for the following letters on the cord: S, SJ, ST, or SO markings on the cord.
- Inspect all electrical cords for signs of wear and exposed wiring, strain, and ripped, torn, cut or burned insulation. Defective cords shall be removed from service.
- Electrical tools and equipment must be grounded, of the double insulated or cordless type battery operated.
- Fuel generators before use and re-fuel only after the engine has been shut down and allowed to cool.
- Never use a portal generator indoors. Locate a generator so that the exhaust is downwind from your position or locations where carbon monoxide can enter (e.g. confined spaces, indoor locations etc.).

3.1.3 Falls on Same Level

Falls from slips and trips are common workplace occurrences that can result in serious injuries and disabilities. The most common types of falls are falls at the same level. Fall hazards exist in most workplaces including offices, manufacturing and construction. Slips and trips can be prevented by following these guidelines:

- Personnel shall be vigilant in providing clear footing, clearly identifying obstructions, holes, protruding objects or other tripping hazards and maintaining an awareness of uneven terrain and slippery surfaces;
- Walking and working surfaces shall be kept free of materials, obstructions, and substances that could cause a surface to become slick or otherwise hazardous;
- Always utilize roads, pathways, or other designated routes or travel. Do not take shortcuts;
- Makeshift substitute ladders such as toolboxes, buckets, and coolers shall not be used;

- It is prohibited from multi-tasking while using a cell phone, text messaging, or using other personal headsets;
- Walk around, not over or on, debris or equipment that might have been stored in the work area;
- Don't jump from platforms or truck beds;
- Don't climb on stock piles or trucks; and
- When carrying equipment, identify a path that is clear of any obstructions. It might be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on-site.

Falls from elevation greater than 6 feet above a lower level or less than 6 feet above dangerous equipment can result in serious injury and even death. To prevent falls from elevations the walking and working surface must be surrounded on all open sides by standard railings or their equivalent (fence, barricade or cover), or by employees who are protected by a personal fall arrest system.

3.1.4 Hand and Power Tools

Employees who use hand and power tools and are exposed to the hazards of falling, flying, abrasive, and splashing objects, or to harmful dusts, fumes, mists, vapors, or gases must be provided with the appropriate personal protective equipment.

Work operations will require employees to use utility knives for opening boxes, etc. Shovels, slam bars, and other hand tools may also be needed to perform work. Use of this equipment will be performed in accordance with *S3NA-305-PR Hand and Power Tools*.

Basic safety guidelines when using cutting and other hand tools includes:

- Keep all tools in good condition with regular maintenance;
- Use the right tool for the job;
- Examine each tool for damage before use and do not use damaged tools;
- Operate tools according to the manufacturers' instructions;
- Provide and use properly the right personal protective equipment;
- All electrical connections for these tools must be suitable for the type of tool and the working conditions (wet, dusty, flammable vapors);
- A ground-fault circuit interrupter (GFCI) must be used; and
- Noise hazard associated with pneumatic tools. Working with noisy tools requires proper, effective use of appropriate hearing protection.

3.1.5 Manual Lifting

Using the proper techniques to lift and move heavy pieces of equipment (i.e. sample coolers) is important to reduce the potential for back injury. Manual lifting is addressed in *SOP S3NA-308-PR, Manuel Lifting*. The following precautions should be implemented when lifting or moving heavy objects:

- Bend at the knees, not the waist. Let your legs do the lifting;

- Do not twist while lifting;
- Bring the load as close to you as possible before lifting;
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards;
- Use mechanical devices to move objects that are too heavy to be moved manually; and,
- If mechanical devices are not available, ask another person to assist you.

3.1.6 Noise Exposure

The use of construction equipment can expose the field team to noise levels that exceed the 85 dB for an 8-hour day. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period;
- Interference with speech communication and the perception of auditory signals;
- Interference with the performance of complicated tasks;
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ; and

Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone two (2) feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating ("NRR") of 27 decibels ("dB").

3.1.7 Operating Motor Vehicles

Work activities will require authorized drivers to operate company owned or leased vehicles. Site conditions may require vehicles to be operated in and around the work area consisting of an off-road surface. Operating a motor vehicle is addressed in *SOP S3NA-005-PR Vehicle and Driver Safety Program*.

Only Authorized Drivers shall operate a motor vehicle (rental, personal, or AECOM owned/leased) while on AECOM business. Authorized drivers shall:

- Possession of the appropriate qualifications;
- Having a good driving record;
- Comply with AECOM's Global Travel Policy and the applicable state laws while operating a motor vehicle;
- Use of a cell phone or text messaging while driving is strictly prohibited. It is illegal to use a cell phone or text message while driving in Massachusetts;
- Seat belts shall be worn by all occupants whenever the vehicle is in motion;
- The number of passengers shall not exceed the manufacturer's specifications for the vehicle;
- Loads shall be secured and shall not exceed the manufacturer's specifications and legal weight limits for the vehicle, or regulatory requirements (i.e., threshold for DOT);

- Headlights or daytime running lights will be used at all times the vehicle is operating;
- Secure the vehicle with the emergency brake and caulk blocks when parked on a slope;
- Perform pre-operation vehicle inspections;
- Arrange for preventive maintenance services for the vehicle and maintain it in sound mechanical condition;
- Not operate the vehicle if unsafe or if conditions exist that would likely result in vehicle damage or personal injury;
- Not use the vehicle for any unofficial use including personal business unless specific permission is given by the Supervisor;
- Transport only persons on AECOM related business or those persons receiving transportation as a prescribed service;
- Not pick up hitchhikers;
- Not use the vehicle for transportation to or from work or park at a residence overnight unless approved by the employee's Supervisor;
- Not smoke or allow anyone else to smoke in the vehicle;
- Be responsible for any damage caused by abuse of the vehicle; and
- Secure the vehicle when left unattended.

Extra caution is required when operating a motor vehicle on an off-road surface to prevent getting stuck, injury, or damage. Off-road driving should use the following guidelines:

- If inexperienced, seek supervisory advice and training;
- Vehicles should only be driven off roads after all other options have been considered;
- Prior to driving off-road check to see that the vehicle is in good operating condition and your tires are properly inflated. Realize the limitation of your vehicle and do not become over confident;
- Seat belts should be kept fastened at all times and all loose objects in the vehicle securely fastened to prevent them from becoming projectiles;
- Drive according to the ground conditions. Speed and power are not required in rough off-road driving. Monitor the ground conditions ahead of the vehicle. Before driving over rough terrain, the terrain should be inspected on foot first;
- When slowly traversing difficult areas of soft ground, try to keep the vehicle in motion. Once stopped it will be far more difficult to get it going again. If the vehicle becomes stuck, do not spin the wheels, as it will dig them further into the ground and will emit projectiles causing potential injury and damage. Slowly rock the vehicle backwards and forwards until the vehicle becomes dislodged. If not, place appropriate material (wooden planks, mats, branches, etc.) under the wheel to improve traction;
- When climbing hills, always proceed straight up or down. Never drive a hill at an angle. Do not attempt to climb a hill if you do not feel confident that the vehicle will climb it safely; and
- Prior to returning to the road, do a vehicle inspection to confirm the vehicle is road worthy.

3.1.8 Overhead Utilities

Accidental contact with an energized line or arcing between a high power line and grounded equipment can cause electrocution of equipment operators or nearby ground personnel, and damage to power transmission and operating equipment. While maintaining a safe distance from all energized lines is the preferred means for control of this hazard, Site conditions may not always accommodate this. Additional information on Overhead Electrical Lines can be found in SOP S3NA-406-PR *Electrical Lines, Overhead*.

If work will (or may) occur within 50 feet of any energized line. Safe working distance is the minimum distance which must be maintained between any energized electrical line and any part of the operating equipment to maintain adequate safety margins, and is based on the line voltage of the power line. The following safe working distance criteria will be applied for all AECOM operations:

- Determine the voltage of the power line by contacting the utility company or owner;
- Unless verified, it will be assumed that all lines are energized; and
- When power lines cross the Site or access roads, signs shall be posted on each side of the crossing approach indicating the presence of the power lines. On heavily travel routes rider poles or “goalposts” shall be located on each side of the crossing approach to ensure the lowering of booms, mast, dump bodies, and other attachments to a safe position.

Line Voltage (Kilovolts) Minimum Safe Working Distance

Line Voltage (Kilovolts)	Minimum Safe Working Distance
0 – 50	10 feet
>50 – 200	15 feet
>200 – 350	20 feet
>350 – 500	25 feet
>500 – 750	35 feet
>750 – 1000	45 feet
Source: American National Standards Institute, Publication B30.5.	

3.1.9 Spill Prevention

The purpose of this section is to define practices and procedures for the prevention, containment, and cleanup of incidental discharges of hazardous substances during the project. These substances include both the contaminated material encountered as a result of the environmental activities, such as contaminated soils and decontamination liquids, and fluids, such as lubricating fluids, diesel fuel, gasoline, etc.

3.1.9.1 Prevention

Prevention of unnecessary spills is of first priority. Prevention measures include:

- All equipment will be inspected for leaks before daily and after service.
- All containers will be inspected daily for decay. No open container will be exposed to rainfall, snowfall, etc. without being emptied and cleaned of residue.

- Storage of material such as fuels, oils, and solvents on-site will be limited to the minimum required. All fluids will be stored in individual fluid containers appropriate and approved for the material.
- Drums or other containers too large to be stored in containers will be stored raised off the ground on a liner and covered by plastic.
- All nearby storm sewers, catch basins, drains, and related structures will be protected from being impacted from investigation-related runoff and/or releases to the environment. Prevention methods, such as booms, berms or other effective materials, will be used as necessary to ensure proper mitigation.

3.1.9.2 Release Reporting

All releases must be reported to the AECOM PM, Regional Safety Health and Environmental Manager and Incident Reporting Line at (800-348-5046), with the PM providing notification to the Client representative, no matter how small of a release. Consideration will need to be given to whether or not the release is deemed to be a reportable to the New York Department of Environmental Conservation (DEC) or the EPA, National Spill Response Center. See Section 10.3 Environmental Spill/Release Reporting.

After initial response actions have been completed an incident investigation will be performed to determine the root causes of the incident and corrective actions, and lessons learned shall be shared to prevent future reoccurrence. Once the response is complete, the responding personnel will conduct an inventory of supplies used during the response effort and re-stock any used response equipment that could not be decontaminated and reused.

3.1.9.3 Response to Release

A spill containment kit shall be available on the site. The spill containment kit shall contain the following items; sock boom, sorbent pads and granular absorbent. The response for a release of potentially hazardous material entails the following:

- Determine the nature of the substance released.
- Eliminate all sources of ignition.
- Isolate the affected area or initiate area evacuation.
- Contain the flow of the material from the source if this can be done safely (diking/berms drip pan).
- Following the procedures and using the protective equipment as indicated by the Safety Data Sheet (SDS), contain the release to the smallest area possible and initiate cleanup
- Dispose of all residues in accordance with the SDS.

3.1.10 Underground Utilities

New York State Law requires that a utility clearance be performed prior to initiation of any subsurface work. The number to call in this area to request a mark-out of natural gas, electric, telephone, cable television, water and sewer lines in the proposed excavation or boring locations is 811. Work will not begin until the required utility clearances have been performed. Additional information on underground utilities can be found in *SOP S3NA-417-PR Utilities, Underground*.

Utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, the drilling contractor must exercise due diligence and try to identify the location of any private utilities on the property being investigated. AECOM can fulfill this requirement in several ways, including:

- Obtaining as-built drawings for the areas being investigated from the property owner;
- Visually reviewing each proposed soil boring locations with the property owner or knowledgeable Site representative;
- Performing a geophysical survey to locate utilities; and
- Hiring a private line locating firm to determine the location of utility lines that are present at the property.

All underground utilities shall be exposed via hand or soft-dig techniques within 5 feet of a mark out or within the distance required by the owner of the utility before operating any mechanized equipment. Use of mechanical means or using a hand auger is not permitted.

- When soft digging use a non-cutting nozzle. A digging bar should be limited to prying out material encountered during the soft-dig; and
- Where hand digging is performed a blunt-nosed shovel must be used to loosen the soil and a regular shovel to remove to remove it. Do not stab at the soil or stomp on the shovel with both feet. A pickax, hand auger, digging bar or similar tools should not be used.

3.2 Wildlife, Plant and Insect Hazards

During the course of field work employees are at risk of being exposed to poisonous plants, insects, spiders and snakes. The two most prevalent biological hazards are poison ivy and ticks. Additional information on Biological Hazards can be found in *S3NA-313-PR Wildlife, Plants and Insects*.

3.2.1 Poison Ivy

Poison ivy is a common cause of a skin irritation called contact dermatitis that may result in a red, itchy rash consisting of small bumps, blisters or swelling. This native perennial grows throughout the Northeast, in woods, fields, and sometimes in the garden. It grows in sun or shade, and in wet or dry places. Its growth habit depends on where it is growing, resulting in a trailing ground cover, free-standing shrub, or a vine supported by trees, shrubbery and fences. All parts of the poison ivy plant contain, urushiol, which causes the allergic reaction. Most poisonings occur during the growing season when the presence of lush foliage increases the chance of contact, but the dormant stems and roots of the vine can cause winter poisoning as well.

The best protection against poison ivy is to avoid contact with the plant (leaves, stems and roots). The best defense against contracting poison ivy is to recognize the plants. The adage “leaves of three, let it be” refers to the groupings of three leaflets connected to a common stem that characterize most of these plants. However, if you cannot avoid poison ivy, follow these precautions to help prevent contact:

- Wear protective clothing such as long-sleeved shirts, long trousers, boots or sturdy shoes with socks and gloves;
- Use a barrier cream such as CoreTex IvyX™ Pre-Contact solution; and

- If heat stress will not be a problem the use of a Tyvek™ coveralls and nitrile gloves is recommended for areas with heavy poison ivy infestation.

If contact with poison ivy has been made or is suspected, follow these guidelines:

- As soon as possible (within 5–10 minutes of contact), wash all exposed skin with strong soap (i.e. Dawn) and water to remove the oil. If this is not possible, rinse thoroughly with water;
- Use a post-contact skin cleanser such as Technu® skin cleanse or CoreTex IvyX™ cleanser towelettes;
- Put on gloves to remove clothes and shoes, and wash clothing in hot water and detergent to remove any plant oil that may be on them;
- Notify your supervisor if contact or suspected contact is made with poison ivy; and
- If a severe allergic reaction develops, seek medical attention.

3.2.2 Ticks

Ticks transmit bacteria that cause illnesses such as Lyme disease or Rocky Mountain spotted fever. Ticks wait for a host from the tips of grasses and shrubs (not from trees). When brushed by a person, they quickly let go of the vegetation and climb onto the host. Ticks can only crawl; they cannot fly or jump. The tick season typically lasts from April through October; peak season is May through July; seasons can vary depending on climate. Ticks can be active on winter days when the ground temperatures are about 45 degrees Fahrenheit.

The best way to protect oneself against tick borne illness is to avoid tick bites. This includes avoiding known tick-infested areas. However, if wooded areas or areas with tall grass and weeds are visited, the following precautions can be used to help prevent tick bites and decrease the risk of disease:

- Wear protective clothing such as long-sleeved shirts, long trousers, boots or sturdy shoes and a head covering. (Ticks are easier to detect on light-colored clothing);
- Tuck trouser cuffs in socks. Tape the area where pants and socks meet so ticks cannot crawl under clothing;
- Apply insect repellent containing 10 percent to 30 percent N,N-Diethyl-meta-toluamide ("DEET") or 5 percent to 10 percent picaridin primarily to clothes. Apply sparingly to exposed skin. Do not spray directly to the face; spray the repellent onto hands and then apply to face. Avoid sensitive areas like the eyes, mouth and nasal membranes. Be sure to wash treated skin after coming indoors;
- Use repellents containing permethrin to treat clothes (especially pants, socks and shoes) but not skin. Always follow label directions; do not misuse or overuse repellents;
- Those who wish to avoid the use of insect repellent or treated clothing should consider the use of the Original Bug Shirt® and pants, and tick/chigger garters;
- Personnel should carefully inspect themselves each day for the presence of ticks or any rashes. This is important since prompt removal of the tick can prevent disease transmission. Removal of the tick is important in that the tick should not be crushed and care must be taken so that the head is also removed. Contact the RSHEM for guidelines on removing ticks; and

- Report tick exposure and bites to your supervisor.

3.2.3 Mosquitos

Mosquitoes are carriers of the West Nile Virus, and other diseases. As mentioned above, DEET is an effective mosquito repellent and is recommended. Although concentrated DEET formulations protect longer than those that are more dilute, little improvement is offered by concentrations of the active ingredient higher than 50 percent. Adverse effects, though documented, are infrequent and are generally associated with gross overuse of the product. Users should avoid the temptation to apply the most concentrated product available. The transient protection offered by more dilute preparations can be extended by reapplication. When using DEET care should be taken to reapply the repellent when its effectiveness wears.

3.2.4 Wasps and Bees

Wasps (hornets and yellow-jackets) and bees (honeybees and bumblebees) are common insects that may pose a potential hazard to the field team if work is performed during spring, summer or fall. Bees normally build their nests in the soil. However, they use other natural holes such as abandoned rodent nests or tree hollows. Wasps make a football-shaped, paper-like nest either below or above the ground. Yellow-jackets tend to build their nests in the ground but hornets tend to build their nests in trees and shrubbery.

To avoid bees and wasps:

- If you see insects flying to and from a particular place, avoid it;
- If you are going to be in an area where disturbing a nest is likely, wear long pants and a long sleeved shirt. Insect repellent applied to your skin or clothing will not deter these stinging insects;
- Wear light colored clothing;
- Remain as calm as possible if a bee or wasp lands on your skin;
- If you don't want to wait for it to leave, gently and slowly brush it away. It is best not to wear perfume, cologne, or other scented soaps or scented shampoos as this attracts bees and wasps; and
- Never swing, strike or run rapidly away since quick movement often provokes attack and painful stings.

When a wasp or a bee stings a person, it injects a venomous fluid under the skin. The venom causes a painful swelling that may last for several days. The following should be followed to minimize the reaction of a bee or wasp sting:

- Gently scrape the area of the bite using a blunt object like a fingernail or a credit card to remove the stinger. If removed within 15 seconds of the sting, the severity of the sting is reduced;
- Try not to rub or scratch the sting site after the stinger is removed;
- Wash the sting site with soap and water;
- Apply a cold or ice pack wrapped in cloth for a few minutes; and

- If you develop hives, difficulty breathing or swallowing, wheezing or similar symptoms of allergic reaction, SEEK MEDICAL ATTENTION IMMEDIATELY. People with known allergies to insect stings should NEVER work alone.

3.3 Weather Hazards

Field activities are not permitted when severe weather conditions exist. The Site Supervisor will monitor real-time weather and local weather forecasts during site work activities. 30-30 Rule: Work will be stopped when there are less than 30 seconds between a flash of lightning and the rumble of thunder and workers will seek shelter promptly. Employees will remain in shelter until 30 minutes after the last flash of lightning or rumble of thunder.

Severe weather can occur with little warning. Employees will be vigilant for the potentials for storms, lightning, high winds, and flash flood events.

3.3.1 Heat Stress

Heat stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat be aware of the signs and symptoms of heat stress and watch fellow employees for signs of heat stress.

Heat stress can be a significant hazard, particularly for non-acclimated personnel operating in a hot, humid setting. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress as outlined in SOP S3NA-511-PR Heat Stress Prevention Program. Heat stress prevention methods are as follows:

- Education of workers on the signs and symptoms of heat related illnesses:
- Provide water and sports drinks.
- Provide a shaded area.
- Evaluate the need for excessive PPE
- Monitor co-workers for signs and symptoms of heat related illnesses
- Establish a work rest cycle- work 40 minutes of every hour with 20 minutes spent at rest in the shade.

3.4 Hazard Analysis

Task Hazard Analyses (THAs) have been completed for all tasks identified in the Scope of Work (Attachment A):

- Geophysical Survey
- Direct Push Drilling/Macrocore Sampling/Grab groundwater sampling
- Drilling/Well Installation

- Land Survey
- Well Development and Groundwater Sampling

As a result of unanticipated work activities or changing conditions, additional THAs may be required. All additional THAs will be reviewed and approved by the SH&E Professional.

3.5 Task Specific SH&E Procedures

As discussed in Section 5.0, personnel may be exposed to a variety of chemical and physical hazards resulting from task or equipment-specific activities. The controls for many of these hazards are discussed in SOPs found in the **300 to 500** Series of the North America SH&E SOPs. Applicable SOPs are shown in bold in below and provided in Attachment C.

3.6 Applicable SOPs

	SOP#	TITLE		SOP#	TITLE
S3NA 000 SERIES— SH&E ESSENTIALS					
<input checked="" type="checkbox"/>	S3NA-004-PR	Incident Reporting			
S3NA 300 SERIES—FIELD(COMMON)			S3NA 500 SERIES—INDUSTRIAL HYGIENE		
<input checked="" type="checkbox"/>	S3NA-301-PR	Confined Spaces	<input checked="" type="checkbox"/>	S3NA-505-PR	Cold Stress Prevention
<input checked="" type="checkbox"/>	S3NA-302-PR	Electrical, General	<input checked="" type="checkbox"/>	S3NA-506-PR	Compressed Gases
<input checked="" type="checkbox"/>	S3NA-304-PR	Fall Protection/Working at Heights	<input checked="" type="checkbox"/>	S3NA-507-PR	Hazardous Materials Communication / WHMIS
<input checked="" type="checkbox"/>	S3NA-305-PR	Hand and Power Tools	<input checked="" type="checkbox"/>	S3NA-508-PR	Hazardous Materials Handling and Shipping
<input checked="" type="checkbox"/>	S3NA-307-PR	Housekeeping, Worksite	<input checked="" type="checkbox"/>	S3NA-509-PR	Hazardous Waste Operations and Emergency Response Activities
<input checked="" type="checkbox"/>	S3NA-308-PR	Manual Lifting, Field	<input checked="" type="checkbox"/>	S3NA-510-PR	Hearing Conservation Program
<input checked="" type="checkbox"/>	S3NA-313-PR	Wildlife, Plants and Insects	<input checked="" type="checkbox"/>	S3NA-511-PR	Heat Stress Prevention
<input checked="" type="checkbox"/>	S3NA-314-PR	Working Alone & Remote Travel	<input checked="" type="checkbox"/>	S3NA-519-PR	Respiratory Protection Program
S3NA 400 SERIES FIELD (UNCOMMON)			<input checked="" type="checkbox"/>	S3NA-520-PR	Spill Response, Incidental
<input checked="" type="checkbox"/>	S3NA-405-PR	Drilling and Boring	<input checked="" type="checkbox"/>	S3NA-521-PR	Decontamination
<input checked="" type="checkbox"/>	S3NA-406-PR	Electrical Lines, Overhead	<input checked="" type="checkbox"/>	S3NA-519-PR	Respiratory Protection Program
<input checked="" type="checkbox"/>	S3NA-410-PR	Hazardous Energy Control			
<input checked="" type="checkbox"/>	S3NA-417-PR	Underground Utilities			

4.0 SH&E Requirements (Safety)

4.1 HAZWOPER Qualifications

Personnel performing work at the job Site must be qualified as HAZWOPER workers (unless otherwise noted in specific THAs or by the SSO), and must meet the medical monitoring and training requirements specified in the AECOM's North America SH&E Standard Operating Procedures.

4.2 Medical Monitoring

In accordance with the requirements of 29 CFR 1910.120(f) site personnel entering the exclusion zone (EZ) or contaminate reduction zone (CRZ) shall be medical qualified to work on a hazardous waste site and to wear respiratory protection.

The medical examinations will be administered on a pre-employment and annual or biannual basis, as warranted in the opinion of examining doctor by symptoms of exposure or specialized activities. These examinations will also be provided to employees upon termination of employment or reassignment to non-hazardous waste site activities. For the purpose of this HASP, all contractors will assume the employer's responsibility in obtaining the necessary medical monitoring for their employees and provide compliance documentation upon request.

If site monitoring procedures indicate that a possible exposure has occurred above the OSHA permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document any symptoms that may be specific to the particular materials present.

4.3 Site-Specific Safety Training

All AECOM personnel performing activities at the Site will be trained in accordance with *S3NA-003-PR SH&E Training*. All personnel are required to remain current in all of their required training and evaluate their need for additional training when there is a change in work. In addition to the general health and safety training programs, personnel will be required to complete any supplemental task specific training developed for the tasks to be performed. Administration and compliance with the requirements for additional task-specific training will be the responsibility of the project or lead manager. Any additional required training that is completed will be documented and tracked in the project files.

4.4 Tailgate Meetings

Prior to the commencement of daily project activities, a tailgate safety meeting will be conducted by the SSO to review the specific requirements of this HASP, applicable THA. Attendance at the daily tailgate meeting is mandatory for all employees at the Site covered by this HASP and must be documented on the attendance form. All safety training documentation is to be maintained in the project file by the SSO.

4.5 Hazard Communication

Hazardous materials that may be encountered as existing on-site environmental or physical/health contaminants during the work activities are addressed in this HASP and their properties, hazards and associated required controls will be communicated to all affected staff and subcontractors.

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 Safety Data Sheet (SDS) to the SSO for review and filing (the SSO will maintain copies of all SDS on-site). SDS may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable in accordance with the requirements of *S3NA-507-PR Hazardous Materials Communication/WHMIS*.

All personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all 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.).

4.6 Confined Space Entry

Confined space entry is not anticipated by AECOM employees for this site. If confined spaces are identified, the SSO/site supervisor will inform all employees of the location of confined spaces and prevent unauthorized entry. Confined space entry procedures and training requirements are listed in *S3NA 301 PR, Confined Spaces*.

Multiple vessels/containers associated with the treatment system could be considered confined spaces; however, they are cleaned by properly licensed and trained hazardous materials contractors with their own confined space entry programs.

4.7 Hazardous, Solid, or Municipal Waste

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable Federal and State regulations.

4.8 General Safety Rules

All Site personnel shall conduct themselves in a safe manner and maintain a working environment that is free of additional hazards, in adherence to *S3NA-001-PR Safe Work Standards and Rules* and *S3NA-103-PR General Housekeeping*.

4.8.1 Housekeeping

During Site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.8.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any AECOM site. Smoking, eating or drinking must be in an approved area.

4.8.3 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

Potable Water - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles or water coolers. Where water coolers are available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.

Non-Potable Water - All containers of non-potable water will be marked with a label stating:

***Non-Potable Water
Not Intended for Drinking Water Consumption***

Toilet Facilities: Where toilet facilities are not located on the jobsite, the crews shall have transportation readily available to nearby toilet facilities.

Washing Facilities - Commercial towelettes or equivalent will be available for cleansing of hands or other body parts.

4.8.4 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on-site can serve as "buddies" for AECOM personnel. Under no circumstances will any employee be present alone in a controlled work area. For areas not in controlled work areas, the procedures outlined in S3NA-314-PR Working Alone Remote Travel will be followed at all times.

4.8.5 Stop Work Authority

All employees have the right and duty to stop work when conditions are unsafe and to assist in correcting these conditions as outlined in S3NA-002-PR Stop Work Authority.

4.8.6 Client Specific Safety Requirements

The client has specified no additional health and safety requirements.

5.0 Exposure Monitoring Procedures (Health)

5.1 Contaminant Exposure Hazards

The following is a discussion of the hazards presented to worker personnel during this project from on-site chemical hazards known, suspected or anticipated to be present on-site.

5.1.1 Volatile Organic Compounds

Volatile Organic Compounds (VOCs) refer to a group of volatile compounds or mixtures that are relatively stable chemically and that exists in the liquid state at temperatures of approximately 32° to 82°F. VOCs are typically organic solvents used for extracting, dissolving, or suspending materials such as fats, waxes, and resins that are not soluble in water.

Inhalation and percutaneous absorption are the primary routes of exposure. Organic compounds are metabolized or they accumulate in the lipid-rich tissues such as the liver, fat cells, or the nervous system. Solvent inhalation by workers can cause effects ranging from an alcohol-like intoxication to narcosis and death from respiratory failure. Symptoms include drowsiness, headache, dizziness, dyspepsia, and nausea.

5.1.2 Semi-Volatile Organic Compounds

A semi-volatile organic compound (SVOC) is an organic compound which has a boiling point higher than water and which may vaporize when exposed to temperatures above room temperature. Semi-volatile organic compounds include phenols and polynuclear aromatic hydrocarbons (PAH). Because of their slow rate of release from sources and because of their propensity to partition into sorbed states, SVOCs can persist for years.

Many SVOCs alter the activity of hormones in humans and wildlife and are therefore known as endocrine disrupting chemicals (EDCs). EDCs are suspected to contribute to the occurrence of neurodevelopmental and behavioral problems (e.g., mental retardation or attention deficit disorder), reproductive abnormalities (e.g., decreased fertility or hypospadias), metabolic disorders (e.g., obesity, diabetes), and cancer (e.g., breast, prostate, and testicular cancers).

5.2 Real-Time Exposure Measurement

5.2.1 Frequency of Air Monitoring

The frequency of the air monitoring is dependent on the type of intrusive work and the location of the work being conducted in the exclusion zone. At the discretion of the Safety Professional, real time air monitoring shall be collected during the initial intrusive activities and periodically throughout the course of the activities (i.e. every 15-30 minutes during remedial activities). Initial air monitoring shall also be conducted when the location of the intrusive work changes, when there has been a change in operations and a change in respiratory protection requirements and/or work practices. Air monitoring readings shall be conducted at breathing zone levels (4- 6 feet above ground level).

5.2.2 Photoionization Detector (PID)

A photoionization detector (PID) with a 10.6 eV lamp will be used to determine the airborne concentration of total organic vapors (ionization potential of < 10.6 eV) of personnel in the exclusion zone. However, should odors be detected without a reading on the PID personnel should move to an upwind location and the source of the odor should be determined and corrective action instituted.

The PID will be functional tested following the manufacturer's instructions. The PID will be maintained in accordance with the manufacturer's instructions. Functional tests shall be recorded in a field logbook. The instruction manual for the instrument must be maintained on the project site.

5.2.2.1 Instrument Action Levels

Action levels are based on consistent 10-15 minute readings as conducted at breathing zone levels (4-6 feet above ground level).

5.2.2.2 Total Organic Vapors

The following limits will be used to assess whether total organic vapor are acceptable in the worker-breathing zone (4-6 feet above ground level) using a PID.

Where the total organic vapor concentration in the worker-breathing zone (4-6 feet above ground level) exceeds 5 ppm above background but less than 10 ppm above background mitigation measure must be implement. Where the total organic vapor concentration in the worker-breathing zone (4-6 feet above ground level) exceeds 10 ppm above background work must stop, contact the Safety Professional and PM.

6.0 Environmental Program

6.1 Environmental Compliance and Management

This project and the individual tasks will comply with all federal, state, provincial, and local environmental requirements.

Project work will be conducted in general accordance with the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010a), technical requirements in Contract D007626 between NYSDEC and AECOM (NYSDEC and AECOM, 2010), and United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

6.1.1 Air Emissions

The treatment system has an exhaust stack that emits less than 0.5 lbs/hour of VOCs per NYSDEC Air Guide 1. Community Air Monitoring will be performed to ensure other field activities allow negligible emissions.

6.1.2 Hazardous Waste Management

IDW will be collected and categorized as non-hazardous or hazardous. Potentially hazardous IDW soil cuttings will be tested and disposed of within 90 calendar days of completing the field activities. Potentially hazardous IDW waste will be staged onsite then delivered to an IDW storage facility for processing. All liquids will be discharged to the treatment system.

6.1.3 Storm Water Pollution Prevention

The treatment system operates under a SPDES equivalent discharge permit (permittee is NYSDEC). No other activities are expected to generate stormwater, since all fluids will be containerized and discharged to the treatment system.

6.1.4 Wetlands Protection

Although there are wetlands within the study area, the activities outlined in this HASP are not expected to infringe upon the wetlands.

6.1.5 Critical Habitat Protection

Based on the Fish & Wildlife Impact Assessment, no critical habitat protection is required for site activities.

6.1.6 Environmental Protection

Due to the nature of the work, no special actions are required to ensure environmental protections.

7.0 Personal Protective Equipment

7.1 Introduction

The purpose of personal protective equipment (PPE) is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. *S3NA-208-PR Personal Protective Equipment Program* lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs.

By signing this HASP the employee agrees to having been trained in the use, limitations, care and maintenance of the protective equipment to be used by the employee at this project. If training has not been provided, request same of the PM for the proper training before signing.

Table 7-1: Personal Protective Equipment

<u>TYPE</u>	<u>MATERIAL</u>	<u>ADDITIONAL INFORMATION</u>
Minimum PPE		
Safety Vest	ANSI Type II high-visibility	Must have reflective tape/be visible from all sides.
Boots	Leather	ANSI approved safety toe.
Safety Glasses		ANSI Approved; ≥98% UV protection.
Hard Hat		ANSI Approved; recommended wide-brim.
Work Uniform		No shorts/cutoff jeans or sleeveless shirts.
Additional PPE:		
Hearing Protection	Ear plugs and/ or muffs	In hazardous noise areas.
Work Gloves	ANSI cut level 2 or higher	If working with sharp objects or powered equipment.
Protective Chemical Gloves	Inner: Disposable Nitrile Outer: Nitrile	
Coveralls	Tyvek- limited splash Tyvek QC- splash	For use where contact with potential COC impacted media exists.
Protective Chemical Boots	Vinyl/Rubber	For use where contact with potential COC impacted media exists.
Level C Respiratory Protection	Contact Regional SH&E Manager for type of respirator and filtering elements.	
Face Shield		Safety glasses or goggles must be worn concurrently.

7.2 Inspection of PPE

Before use of protective clothing, all personnel shall determine that the clothing material is correct for the specified task at hand. The clothing is to be visually inspected for imperfect seams, non-uniform coatings, tears and malfunctioning closures. It is to be held up to the light to check for pinholes. It is to be flexed to observe for cracks or other signs of shelf deterioration. If the product has been used previously, it should be inspected inside and out for signs of chemical deterioration, such as discoloration, swelling and stiffness. During work, the clothing should be periodically inspected for evidence of chemical deterioration, closure failure, tears, punctures and seam discontinuities.

Before using gloves, check for pinhole leaks. Face shields and lenses should be checked for cracks, crazing and fogging. It is imperative that any equipment found to be defective be replaced immediately. Respirators must be inspected in accordance with the manufacturer's instructions. Ensure that the cartridges and filter elements are the proper type.

7.3 PPE Donning Guidance

The following procedures will be used when donning PPE:

- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers (Never cut disposable booties from your feet with basic utility knives);
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves; and
- Don the remaining PPE, such as safety glasses or goggles.

7.4 PPE Doffing Guidance

Whenever a field crew member leaves the exclusion zone of a work area, the following decontamination sequence must be followed:

- Rinse contaminated materials from the boots or remove contaminated overboots;
- Clean reusable protective equipment;
- Remove protective garments and equipment (remove inner gloves last to protect against dermal contact during doffing outer garments);
- All disposable clothing should be placed in plastic bags
- Wash hands, arms, face and neck as appropriate; and
- Proceed to clean area and dress in clean clothing.

8.0 Site Controls/Decontamination

8.1 General

The purpose of site control is to minimize potential contamination of workers, protect the public from site hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. As appropriate, diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made.

8.2 Controlled Work Areas

Each HAZWOPER controlled work area will consist of the following three zones:

- Exclusion Zone: Contaminated work area.
- Contamination Reduction Zone: Decontamination area.
- Support Zone: Uncontaminated or "clean area" where personnel should not be exposed to hazardous conditions.

Each zone will be periodically monitored in accordance with the air monitoring requirements established in this HASP. The Exclusion Zone and the Contamination Reduction Zone are considered work areas. The Support Zone is accessible to the public (e.g., vendors, inspectors).

8.2.1 Exclusion Zone

The Exclusion Zone (EZ) is the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities, and meeting the requirements specified in the applicable THA and this HASP will be allowed in an Exclusion Zone.

The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities.

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas (the EZ and CRZ). If such an entry should occur, the trespasser should be immediately escorted outside the area, or all HAZWOPER-related work must cease. All personnel, equipment,

and supplies that enter controlled-access areas must be decontaminated or containerized as waste prior to leaving (through the CRZ only).

8.2.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is the transition area between the contaminated area and the clean area. Decontamination is the main focus in this area. The decontamination of workers and equipment limits the physical transfer of hazardous substances into the clean area. This area must also be clearly marked with hazard tape and access limited to personnel involved in decontamination.

8.2.3 Support Zone

The Support Zone is an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located. The Support Zone shall have minimal potential for significant exposure to contaminants (i.e., background levels).

Employees will establish a Support Zone (if necessary) at the site before the commencement of site activities. The Support Zone would also serve as the entry point for controlling site access.

8.3 Site Access

All personnel entering the site shall complete the "Site Entry/Exit Log" located at the site trailer or primary site support vehicle.

8.3.1 Site Security

- Maintain security in the Support Zone and at access control points.
- When feasible, install fencing or other physical barrier around the site.
- After hours, enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.
- Secure the equipment

8.4 Decontamination

8.4.1 General Requirements

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment through or over, tracking, or splashing potential or known contaminated/impacted materials, etc).

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the Exclusion Zone (EZ).

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.

Decontamination procedures may vary based on site conditions and nature of the contaminant(s). If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The applicable Safety Data Sheet (SDS) must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated PPE and decontamination materials shall be contained, stored and disposed of in accordance with site-specific requirements determined by site management.

8.4.2 Decontamination Tools

The equipment required to perform decontamination may vary based on site-specific conditions and the nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
- Hoses, buckets of water or garden sprayers for rinsing;
- Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
- Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
- Metal or plastic cans or drums for the temporary storage of contaminated liquids; and
- Paper or cloth towels for drying protective clothing and equipment.

8.4.3 Personal Decontamination

Decontamination will take place in the area designated as the CRZ. Personnel egress to and from this zone will be limited in order to minimize the potential spread of contaminated sediments to clean areas. Under no circumstances is a potentially contaminated person to exit the site by means other than through the CRZ, except in emergencies as directed by the Site Health and Safety Officer. Upon leaving the site for any reason, personnel will be required to remove all contaminated clothing or equipment before leaving the CRZ.

For Level D PPE, disposable gloves will be disposed of as municipal waste. All personnel wearing Modified Level D PPE in a work area must undergo decontamination prior to entering a SZ. In the CRZ, the personnel decontamination area will consist of the following stations:

- **Station 1:** Personnel entering the CRZ will remove the sediment contamination from their outer clothing, boots and instruments using brushes and cloths. Personnel will also wipe down respirators if they have been used.
- **Station 2:** Personnel will remove their outer garment and outer gloves and dispose of them as municipal waste. Personnel will then decontaminate their boots, with an aqueous solution of detergent or other appropriate cleaning solution. These items will then be hand carried to the next station. Inner gloves may then be discarded as municipal waste.
- **Station 3:** Personnel will thoroughly wash their hands and face before leaving the CRZ. Air purifying cartridges will be removed from respirators, if used, and then sanitized, dried and placed in a clean plastic bag.

8.4.4 Equipment Decontamination

All potentially contaminated equipment will remain in the EZ until the end of the activity. A bristle brush and a soap and water solution (Alconox) will be used to remove sediment contamination from all equipment and will be decontaminated accordingly before being removed from the CRZ. A pump sprayer may be utilized for each rinse station.

For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.

For smaller equipment, use the following steps for decontamination:

- Remove majority of visible gross contamination in EZ.
- Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
- Rinse equipment.
- Visually inspect for remaining contamination.

9.0 Project Health and Safety Organization

9.1 Project Manager

The Project Manager (PM), Mr. Walter Howard, 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. The PM will be held responsible for the safety performance of the project.

9.2 Site Supervisor

The site supervisor, Mr. Ross McCredy has the overall responsibility and authority to direct work operations at the job site according to the provided work plans and for implementing and enforcing this HASP and AECOM's SOPs. The Site Supervisor is the AECOM designated Site Safety Officer (SSO).

9.2.1 Responsibilities

The Site Supervisor is responsible to:

- Discuss deviations from the work plan with the PM.
- Discuss safety issues with the PM, and field personnel.
- Development and implementation of corrective actions for site safety deficiencies.
- Conduct inspections of the site for compliance with this HASP and applicable SOPs.
- Investigate all incidents that occur on the project site.

9.2.2 Authority

The Site Supervisor has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the Safety Professional, and the PM.
- Immediately correct any hazards that may appear.

9.2.3 Qualifications

In addition to being Hazardous Waste Operations and Emergency Response (HAZWOPER)-qualified the Site Supervisor is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4). The Site Supervisor has the experience to recognize hazards associated with a particular task, and has the ability to mitigate those hazards.

9.3 Employees

9.3.1 Employee Responsibilities

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

- Understanding and abiding by the policies and procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the HASP or other safety policies.
- Notifying the Site Supervisor and/or PM, in writing, of unsafe conditions and acts.

9.3.2 Employee Authority

The health and safety authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the Safety Professional at any time to discuss potential concerns.
- The right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions.

9.4 Safety Professional

The Safety Professional is the member of the AECOM Safety, Health and Environmental Department assigned to provide guidance and technical support for the project. Duties include the following:

- Approving this HASP and any required changes.
- Reviewing all personal exposure monitoring results.
- Investigating any reported unsafe acts or conditions.

9.5 Subcontractors

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in *S3NA-213-PR Subcontractors*. Each AECOM subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In

particular, each subcontractor is responsible for equipping its personnel with any required personnel protective equipment (PPE) and all required training.

AECOM considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, in order to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to AECOM for review prior to the start of onsite activities, if required.

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the AECOM PM or the Site Supervisor prior to beginning work operations. The Site Supervisor or authorized representative has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

9.6 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 Site Supervisor 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 personal protective equipment which are required for entry to any controlled work area; visitors must comply with these requirements at all times.

10.0 Emergency Response Planning

10.1 Emergency Action Plan

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance. AECOM personnel shall not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). AECOM response actions will be limited to evacuation. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

10.1.1 Site-Specific Emergency Procedures

Site-specific emergency procedures are presented below with site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures.

Table 10-1: Emergency Planning

EMERGENCY	EVACUATION ROUTE	MUSTER LOCATION
Chemical Spill	<ul style="list-style-type: none"> Upwind 	<ul style="list-style-type: none"> TBD depending on location of work for that day (Default to work vehicle)
Fire/Explosion	<ul style="list-style-type: none"> Safest Direct Route 	<ul style="list-style-type: none"> TBD depending on location of work for that day (Default to work vehicle)
Tornado/Severe Weather	<ul style="list-style-type: none"> Safest Direct Route 	<ul style="list-style-type: none"> TBD depending on location of work for that day (Default to work vehicle)
Lightning	<ul style="list-style-type: none"> Safest Direct Route 	<ul style="list-style-type: none"> Work Vehicle
Additional Information		
Communication Procedures	Contact AECOM PM. Direct verbal communications, however; must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight cannot be easily maintained amongst all AECOM personnel because of distance, terrain or other obstructions. Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. AECOM personnel will bring a mobile phone to the site to ensure that communications with local emergency responders is maintained, when necessary.	

10.2 Incident Reporting

The Employee Incident Reporting and Assistance Hotline number is the preferred number to use for any safety- and security-related issues, other than a life-threatening event, in which case, dial 911 immediately. The hotline will route you directly to WorkCare for assistance with injuries when needed, and it will connect you with our DCS Americas Safety, Health & Environment (SH&E) team to assist you in managing incidents and injuries.

1-800-348-5046

10.2.1 Incidents Requiring Reporting

Any injury or illness that occurs while conducting business on behalf of AECOM, such as sprains, strains, pain or discomfort; Any biological exposures (embedded ticks, poison rash, bee stings, fire ant bites, etc.);

- Any motor vehicle incident/accident, regardless of fault, occurring during the course of your work in an AECOM-owned/leased/rented vehicle or a personal vehicle used for business purposes (e.g., body damage, flat tires, cracked windshields, fender-benders, etc.);
- Any damage to property allegedly inflicted by AECOM or our subcontractors (e.g., contact with utilities, broken fences, damaged equipment, etc.);
- Ergonomic pain or discomfort (e.g., back pain, neck pain, strains, sore wrists, etc.);
- Regulatory inspections or site visits by an agent of a regulatory agency (also contact your area or region SH&E manager immediately);
- Environmental spills or releases, regardless of quantity (e.g., hydraulic line breaks, fuel spills, investigative derived waste spills, etc.);
- Any security-related incidents; and
- Near misses—incidents where any of the above could have happened but did not.

10.3 Spill/Release Reporting

All environmental spills or releases of hazardous materials (e.g., fuels, solvents, etc.), whether in excess of the Reportable Quantity or not, will be immediately reported to the AECOM Project Manager (PM) and Regional SH&E Manager. Also you are required to call the Employee Incident Reporting and Assistance Hotline.

The PM is responsible for notifying the client, AECOM legal representative and for determining if the spill or release is reportable to the New York State Department of Environmental Conservation or the EPA, National Spill Response Center.

10.4 Emergency Contacts

EMERGENCY COORDINATORS / KEY PERSONNEL			
NAME	TITLE/WORKSTATION	TELEPHONE NUMBER	MOBILE PHONE
Payson Long	Client Contact	518-402-9813	
Scott Underhill	Account/Client Manager	518-951-2208	518-396-7638
Walter Howard	Project Manager	518-951-2387	518-791-4234
Field Lead	Site Supervisor		
Ross McCredy	Site Safety Officer	518-951-2304	315-794-5536
Michael Grasso	Operations S&H		607-201-6737
Ben Bertolotti	Regional SH&E Manager	973-777-3003	973-572-3916
Incident Reporting	Incident Reporting Line	(800) 348-5046	
ORGANIZATION / AGENCY			
NAME			TELEPHONE NUMBER
Police Department (local)			911
Fire Department (local – Broadalbin Kenneyetto FD)			911
Ambulance Service (<i>EMT will determine appropriate hospital for treatment</i>)			911
Emergency Hospital (<i>Use by site personnel is only for non-emergency cases</i>)			518-243-4000
Nathan Littauer Hospital 2497 NY-30 Mayfield, NY Emergency Hospital Route: See Section 10.5			518-661-5493
Poison Control Center			(800) 222-1222
National Response Center			(800) 424-8802
NYSDEC 24-hr Spill Hotline			(800) 457-7362
PUBLIC UTILITIES			
NAME			TELEPHONE NUMBER
Dig Safely New York			811

10.5 Emergency Hospital Route/Detail Map

7/27/2015

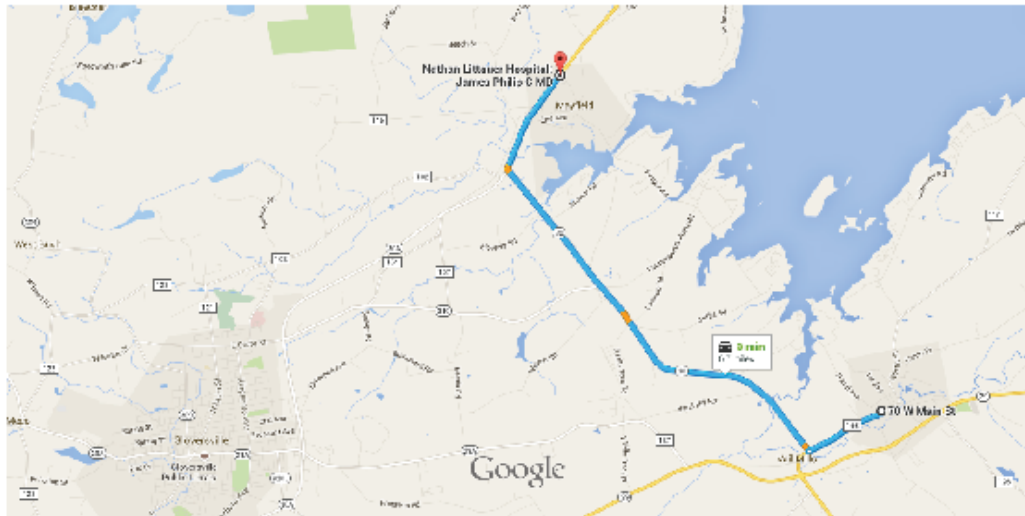
70 W Main St, Mayfield, NY 12117 to Nathan Littauer Hospital: James Philip C MD - Google Maps



Google

70 W Main St, Mayfield, NY 12117 to Nathan Littauer Hospital: James Philip C MD

Drive 6.7 miles, 9 min



70 W Main St
Mayfield, NY 12117

- ↑ 1. Head west on County Hwy 155/W Main St toward S 2nd Ave
Continue to follow County Hwy 155
0.9 mi
- ↘ 2. Turn right onto NY-30 N
Destination will be on the right
5.8 mi

Nathan Littauer Hospital: James Philip C MD
2497 New York 30, Mayfield, NY 12117

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.

Map data ©2015 Google 1 mi

Attachment A

Task Hazard Analyses

Task Hazard Analysis



Project Name	Korkay, Inc.	Project Number	60273289
Client	NYSDEC	Location	Latham
Start Date	7/27/2015	End Date	3/1/2018
Field Supervisor	McCredy, Ross	Project Manager	Howard, Walter
Region	US - North	Business Line	Environment
Task Name	Drilling and Well Installation Oversight	Task Frequency	One Time

Associated Safe Work Plan, Health and Safety Plan or other project safety plan:

HASP, Korkay Site, 70 West Main Street, Broadalbin, NY

Job Events

Travel

drive in personal, rented or company vehicle to/from site from hotel or home.

Hazards

1. Driving, vehicle

Normal local traffic.

Risk: medium

Site Specific Primary Controls:

Complete a pre-use visual inspection. No hand-held electronic devices. Be aware of road conditions and drive only to your comfort level.

Required Trainings:

Vehicle and Driver Awareness eLearning (AECOM)

Key SOPs:

S3NA-005-PR Driver and Vehicle Safety Program; S3NA-205-PR, Equipment Inspections

PPE:

Have a radio, cell phone or other communication device for emergency use

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be replaced with properly working equipment.

Existing Site Hazards

Heat/cold stress, vehicular traffic (working near road and moving between locations), slips/trips/falls, biological hazards, weather hazards.

Hazards

1. Heat or sun exposure

Low risk outside of summer months

Risk: medium

Site Specific Primary Controls:

Buddy system; heat stress monitoring; heat stress control plan (including shelters, work rotation, methods of cooling)

Required Trainings:

Heat Stress Awareness Training

Key SOPs:

S3NA-511-PR Heat Stress Prevention

PPE:

Hat; sunglasses; extra water; sunscreen

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

2. Drill rigs (other onsite operators)

All drilling activities to be conducted by one of AECOM's NYSDEC Standby Contractors that is pre-approved in SUBPORT. Work includes oversight of subcontractor performing direct push and hollow-stem auger drilling with groundwater sample collection and monitoring well installation.

Risk: medium

Site Specific Primary Controls:

All equipment/rigs will have undergone a daily inspection. Contractors have direct control over the application and operation of all equipment. Maintain good housekeeping.

Required Trainings:

All staff shall be provided with on-site orientation to the rig, emergency shut-off location, and its operator.

Key SOPs:

S3NA-405-PR Drilling, Boring and Direct Push Probing; S3NA-205-PR, Equipment Inspections;; S3NA-213-PR Subcontractors

PPE:

Hard hat; safety boots; reflective vest; eye protection/safety glasses and/or goggles

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Underground Utilities / Ground Disturbance

Risk: high

Site Specific Primary Controls:

Do not dig until all underground lines (within 100 feet of work area) have been located and marked. Expose all lines (within 15 feet) by hand before excavating.

Required Trainings:

Underground Utility Avoidance Awareness Training

Key SOPs:

S3NA-417-PR Utilities, Underground;; S3NA-303-PR Excavation and Trenching

PPE:

Hard hat; safety boots; reflective vest

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

drilling contractor to perform DigSafely NY utility markout for all locations. AECOM geophysical subcontractor to clear vicinity of all borings and wells.

4. Exposure, Cold or Snow

seasonal

Risk: low

Site Specific Primary Controls:

Work in pairs; review prevention, symptoms and treatment guidelines for hypothermia and frost bite; plan work in accordance with ACGIH work-warming schedules

Required Trainings:

Cold Stress Prevention Awareness Training

Key SOPs:

S3NA-505-PR Cold Stress Prevention

PPE:

Layers of clothing; thermal hand, face, body and foot protection

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

5. Natural Biological Hazards

ticks, poison plants

Risk: low

Site Specific Primary Controls:

If hazardous insects or plants such as ticks, poison oaks are identified or suspected in a work area, controls including the use of disposable (Tyvek) coveralls, insect repellent (23.8% DEET or similar), light colored clothing, barrier creams, frequent tick checks should be implemented. Additionally, all field clothing and equipment should be thoroughly cleaned, removed and/or segregated from clean clothing, equipment and supplies to avoid transfer of hazardous plants/insects. All employees should bath immediately following fieldwork and use soaps/cleaners designed to remove oils associated with poison oak, and conduct a full body tick check using a mirror.

Required Trainings:

Natural Biological Hazards Awareness Training (AECOM)

Key SOPs:

S3NA-313-PR Wildlife, Plants and Insects

PPE:

Wear long pants and shirts; deterrents

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

6. Traffic (working around live traffic; roadways/highways)

some borings will be near or within municipal road right-of-way.

Risk: medium

Site Specific Primary Controls:

Pull vehicles as far off the road as possible. Activate four-way hazard lights Avoid turning your back on traffic. Do not enter the roadway except to cross the road. Road crossings shall be made at ninety degree angles to traffic flow.

Required Trainings:

Traffic Safety Awareness Training (AECOM)

Key SOPs:

S3NA-306-PR Highway and Road Work

PPE:

High visibility vests;; Retro-reflective stripes (for night work);

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

Keep rig and all equipment as far off road pavement as possible. Use traffic cones and barricades or flagman if needed when working within right-of-way.

AECOM Activities and Hazards

Drilling subcontractor oversight, collection of samples, recordkeeping, monitoring subcontractor decon and IDW management.

Hazards

1. Contaminated Materials Handling (debris, soils, liquids, etc.)

soil and groundwater may contain low levels of petroleum and chlorinated hydrocarbons. Soil, gw, decon materials to be drummed by drilling subcontractor and staged on site for subsequent off-site disposal.

Risk: medium

Site Specific Primary Controls:

Avoid direct contact, use tools whenever possible. Decontaminate and dispose of contaminated tools/equipment. Stand upwind of contaminated materials.

Required Trainings:

HAZWOPER 40hr, 8hr Respiratory Protection Fit Test Respiratory/Asbestos Medical Clearance

Key SOPs:

S3NA-519-PR Respiratory Protection Program S3NA-602-PR Expoure Monitoring S3NA-605-PR Medical Surveillance Program

PPE:

Chemical resistant gloves (per HASP requirements), chemical resistant clothing, respiratory protection.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

2. Spills or releases (existing - HAZWOPER)

the Korkay Site is a listed NYS Inactive Hazardous Waste site.

Risk: medium

Site Specific Primary Controls:

Refer to the HASP

Required Trainings:

HAZWOPER 8-Hour Refresher Training

Key SOPs:

S3NA-509-PR Hazardous Waste Operations and Emergency Response

PPE:

As per the HASP

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Storing or Staging Materials and Supplies

trip hazards

Risk: medium

Site Specific Primary Controls:

Secure against tipping/falling. Store heavy items low, clearly identify materials. Store items out of travel paths to prevent trip creation of trip hazards.

Required Trainings:

Workplace Housekeeping Awareness Training

Key SOPs:

S3NA-307-PR Housekeeping, Worksite

PPE:

Leather work glove, safety glasses, hard hat when overhead hazards exist.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Client Requirements and other Controls

Approval Log

Name	Outcome/Comments	Timestamp	
Howard, Walter	Approved	7/29/2015	11:16:02 AM
McCredy, Ross	Approved	7/29/2015	11:10:47 AM
Grasso, Michael	Approved	7/30/2015	10:56:43 AM

Sign Off Log

Name	Outcome/Comments	Timestamp	
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Field Team Conducting this Task

(sign here on hardcopy if names are not included in log above)

Name	Signature	Company	Date

The THA is your field visit tool:

- All crew members need to review, understand, and sign the THA prior to work commencing.
- Keep the THA in a central location on site (e.g. the truck) to review daily during your tailgate meeting and update as required.

Emergency Response Plan

Refer to On-site Emergency Response Procedures

**Do you need to add additional information or file attachments to this approved THA?
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Task Hazard Analysis



Project Name	Korkay, Inc.	Project Number	60273289
Client	NYSDEC	Location	Latham
Start Date	7/28/2015	End Date	3/1/2018
Field Supervisor	McCredy, Ross	Project Manager	Howard, Walter
Region	US - North	Business Line	Environment
Task Name	Groundwater Sampling and Development	Task Frequency	Routine

Associated Safe Work Plan, Health and Safety Plan or other project safety plan:

HASP, Korkay Site, 70 West Main Street, Broadalbin, NY

Job Events

Travel

Drive in personal, rented, or company vehicle to/from site to office/hotel/home

Hazards

1. Driving, vehicle

Driving to/from site and from well location to well location along live travel

Risk: medium

Site Specific Primary Controls:

Complete a pre-use visual inspection. No hand-held electronic devices. Be aware of road conditions and drive only to your comfort level.

Required Trainings:

Vehicle and Driver Awareness eLearning (AECOM)

Key SOPs:

S3NA-005-PR Driver and Vehicle Safety Program; S3NA-205-PR, Equipment Inspections

PPE:

Have a radio, cell phone or other communication device for emergency use

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Existing Site Hazards

Weather, uneven terrain, slips/trips/falls, residential/commercial traffic, biological hazards

Hazards

1. Heat or sun exposure

Only an issue during summer months

Risk: medium

Site Specific Primary Controls:

Buddy system; heat stress monitoring; heat stress control plan (including shelters, work rotation, methods of cooling)

Required Trainings:

Heat Stress Awareness Training

Key SOPs:

S3NA-511-PR Heat Stress Prevention

PPE:

Hat; sunglasses; extra water; sunscreen

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

2. Exposure, Cold or Snow

Only an issue during winter months

Risk: low

Site Specific Primary Controls:

Work in pairs; review prevention, symptoms and treatment guidelines for hypothermia and frost bite; plan work in accordance with ACGIH work-warming schedules

Required Trainings:

Cold Stress Prevention Awareness Training

Key SOPs:

S3NA-505-PR Cold Stress Prevention

PPE:

Layers of clothing; thermal hand, face, body and foot protection

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Slip, trip, fall

uneven ground, branches, equipment throughout site

Risk: medium

Site Specific Primary Controls:

Take inventory of your surroundings noting any conditions which may pose a slip, trip or fall hazard. Clear and walk your pathway prior to work beginning. Make any corrective actions to eliminate hazards, erect barricades or place warning signs and cones to raise awareness to hazards that can't be engineered out. Evaluate work area and access routes for locations where fall prevention may be beneficial to field staff. Install low or zero-impact fall protection (e.g., stake-supported railings, cable, or ropes) as appropriate to provide handholds. Maintain strong housekeeping habits. Keep worksites clean and free from debris, spills or other slip/trip hazards.

Key SOPs:

S3NA-307-PR Housekeeping, Worksite

PPE:

Footwear appropriate to the site

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

4. Traffic (working around moving traffic; non-roadways/highways)

Normal, local traffic

Risk: medium

Site Specific Primary Controls:

Maintain a safe distance from moving vehicles/equipment, visual contact with drivers and operators. Stage activities away from vehicles and paths of travel.

Required Trainings:

Traffic Safety Awareness Training (AECOM)

PPE:

High visibility vests, traffic control and warning devices as needed.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

5. Natural Biological Hazards

Ticks, bees, wasps, poison ivy/oak/sumac

Risk: low

Site Specific Primary Controls:

If hazardous insects or plants such as ticks, poison oaks are identified or suspected in a work area, controls including the use of disposable (Tyvek) coveralls, insect repellent (23.8% DEET or similar), light colored clothing, barrier creams, frequent tick checks should be implemented. Additionally, all field clothing and equipment should be thoroughly cleaned, removed and/or segregated from clean clothing, equipment and supplies to avoid transfer of hazardous plants/insects. All employees should bath immediately following fieldwork and use soaps/cleaners designed to remove oils associated with poison oak, and conduct a full body tick check using a mirror.

Required Trainings:

Natural Biological Hazards Awareness Training (AECOM)

Key SOPs:

S3NA-313-PR Wildlife, Plants and Insects

PPE:

Wear long pants and shirts; deterrents

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

AECOM Activities and Hazards

open wells, gauging wells, develop wells, collect water quality data, collect groundwater samples, transport purge/development water

Hazards

1. Walking (uneven terrain, steep slopes, wet slippery surfaces)

Risk: medium

Site Specific Primary Controls:

Use handrails, trekking poles or other aid to reduce stress on legs and prevent falls. Identify and avoid steep slopes, slippery areas, wet conditions. Evaluate work area and access routes for locations where fall prevention may be beneficial to field staff. Install low or zero-impact fall protection (e.g., stake-supported railings, cable, or ropes) as appropriate to provide handholds.

PPE:

As required by task, Trekking poles or similar (as appropriate for task)

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

2. Contaminated Materials Handling (debris, soils, liquids, etc.)

Elevated concentrations of chlorinated solvents in groundwater

Risk: medium

Site Specific Primary Controls:

Avoid direct contact, use tools whenever possible. Decontaminate and dispose of contaminated tools/equipment. Stand upwind of contaminated materials.

Required Trainings:

HAZWOPER 40hr, 8hr Respiratory Protection Fit Test Respiratory/Asbestos Medical Clearance

Key SOPs:

S3NA-519-PR Respiratory Protection Program S3NA-602-PR Expoure Monitoring S3NA-605-PR Medical Surveillance Program

PPE:

Chemical resistant gloves (per HASP requirements), chemical resistant clothing, respiratory protection.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Sharp Objects/Tools (handling and use)

Lab supplied bottleware is glass and easily breakable-exercise caution; cutting tools for tubing

Risk: medium

Site Specific Primary Controls:

Avoid direct contact with sharp objects, use only safety - approved cutting tools. Observe location of hands/fingers in relation to sharp object/tool.

PPE:

Gloves, as per required by task

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

4. Eye Exposure to Chemicals (Splashes or Vapors)

Contaminated groundwater

Risk: medium

Site Specific Primary Controls:

Employees requiring corrective lenses will obtain prescription safety eyewear that conforms with applicable standards (ANSI Z87.1/CSA Z94.3); ventilate work space to prevent the accumulation of fumes, minimize the amount of chemicals handled to reduced splash potential.

Required Trainings:

PPE Awareness

Key SOPs:

S3NA-208-PR

PPE:

(Rx) Safety Glasses or Goggles (over Rx glasses); add Face Shield; no Contact Lenses permitted

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

contact lenses Okay

5. Pinch points

Opening wells, assembling pumps, etc.

Risk: medium

Site Specific Primary Controls:

Take extra caution when handling tools, working with machinery, or lifting loads.

Key SOPs:

S3NA-308-PR Manual Lifting, Field;; S3NA-209-PR Project Hazard Assessment and Planning;; S3NA-307-PR Housekeeping, Worksite;; S3NA-411-PR Machine Guarding

PPE:

Work gloves

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

6. Hand tools (non-powered)

Opening wells, assembling pumps, etc.

Risk: low

Site Specific Primary Controls:

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 or identified as such.

Required Trainings:

Hand and Power Tool Safety Awareness Training; Staff shall receive hands-on training with an experienced individual.

Key SOPs:

S3NA-305-PR Hand and Power Tools

PPE:

Safety boots; safety glasses, gloves, eye protection

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

7. Storing or Staging Materials and Supplies

Trip hazard

Risk: medium

Site Specific Primary Controls:

Secure against tipping/falling. Store heavy items low, clearly identify materials. Store items out of travel paths to prevent trip creation of trip hazards.

Required Trainings:

Workplace Housekeeping Awareness Training

Key SOPs:

S3NA-307-PR Housekeeping, Worksite

PPE:

Leather work glove, safety glasses, hard hat when overhead hazards exist.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Client Requirements and other Controls

Approval Log

Name	Outcome/Comments	Timestamp	
Howard, Walter	Approved	7/29/2015	11:01:25 AM
McCredy, Ross	Approved	7/29/2015	11:04:38 AM

Sign Off Log

Name	Outcome/Comments	Timestamp
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Field Team Conducting this Task

(sign here on hardcopy if names are not included in log above)

Name	Signature	Company	Date

The THA is your field visit tool:

- All crew members need to review, understand, and sign the THA prior to work commencing.
- Keep the THA in a central location on site (e.g. the truck) to review daily during your tailgate meeting and

update as required.

Emergency Response Plan

Refer to On-site Emergency Response Procedures

**Do you need to add additional information or file attachments to this approved THA?
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Task Hazard Analysis



Project Name	Korkay, Inc.	Project Number	60273289
Client	NYSDEC	Location	Latham
Start Date	7/28/2015	End Date	3/1/2018
Field Supervisor	Wolf, Gerlinde	Project Manager	Howard, Walter
Region	US - North	Business Line	Environment
Task Name	ISCO Injection Oversight	Task Frequency	One Time

Associated Safe Work Plan, Health and Safety Plan or other project safety plan:

HASP, Korkay Site, 70 West Main Street, Broadalbin, NY

Job Events

Travel

Drive vehicle from office to site

Hazards

1. Driving, vehicle

Drive vehicle from office to site

Risk: medium

Site Specific Primary Controls:

Complete a pre-use visual inspection. No hand-held electronic devices. Be aware of road conditions and drive only to your comfort level.

Required Trainings:

Vehicle and Driver Awareness eLearning (AECOM)

Key SOPs:

S3NA-005-PR Driver and Vehicle Safety Program; S3NA-205-PR, Equipment Inspections

PPE:

Have a radio, cell phone or other communication device for emergency use

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Existing Site Hazards

Heat/Cold stress, vehicular traffic (working near road and moving equipment), slips/trips/falls, biological hazards, weather hazards

Hazards

1. Heat or sun exposure

Low risk outside of summer months

Risk: medium

Site Specific Primary Controls:

Buddy system; heat stress monitoring; heat stress control plan (including shelters, work rotation, methods of cooling)

Required Trainings:

Heat Stress Awareness Training

Key SOPs:

S3NA-511-PR Heat Stress Prevention

PPE:

Hat; sunglasses; extra water; sunscreen

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

2. Exposure, Cold or Snow

Seasonal

Risk: low

Site Specific Primary Controls:

Work in pairs; review prevention, symptoms and treatment guidelines for hypothermia and frost bite; plan work in accordance with ACGIH work-warming schedules

Required Trainings:

Cold Stress Prevention Awareness Training

Key SOPs:

S3NA-505-PR Cold Stress Prevention

PPE:

Layers of clothing; thermal hand, face, body and foot protection

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Mobile/Heavy equipment (Working Near)

working near Geoprobe, All drilling and injection activities will be completed by AECOM's subcontractor, Regensis. AECOM is conducting oversight only.

Risk: medium

Site Specific Primary Controls:

Ground personnel shall always yield to and stay alert of the location and activities of equipment. Do not approach active areas unless the operators' have given permission. Do not ride on mobile equipment unless there is seat for a passenger.

Required Trainings:

Heavy & Mobile Equipment Safety Awareness Training

Key SOPs:

S3NA-309-PR Mobile or Heavy Equipment; S3NA-205-PR, Equipment Inspections

PPE:

Hard hat; safety boots; reflective vest; hearing protection, eye protection as needed

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

4. Slip, trip, fall

walking around site while activities are performed

Risk: medium

Site Specific Primary Controls:

Take inventory of your surroundings noting any conditions which may pose a slip, trip or fall hazard. Clear and walk your pathway prior to work beginning. Make any corrective actions to eliminate hazards, erect barricades or place warning signs and cones to raise awareness to hazards that can't be engineered out. Evaluate work area and access routes for locations where fall prevention may be beneficial to field staff. Install low or zero-impact fall protection (e.g., stake-supported railings, cable, or ropes) as appropriate to provide handholds. Maintain strong housekeeping habits. Keep worksites clean and free from debris, spills or other slip/trip hazards.

Key SOPs:

S3NA-307-PR Housekeeping, Worksite

PPE:

Footwear appropriate to the site

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

watch for equipment, hoses, electrical lines etc on the ground while walking. Watch for slippery surfaces.

5. Traffic (working around live traffic; roadways/highways)

Some injection locations will be adjacent to active roadways

Risk: medium

Site Specific Primary Controls:

Pull vehicles as far off the road as possible. Activate four-way hazard lights Avoid turning your back on traffic. Do not enter the roadway except to cross the road. Road crossings shall be made at ninety degree angles to traffic flow.

Required Trainings:

Traffic Safety Awareness Training (AECOM)

Key SOPs:

S3NA-306-PR Highway and Road Work

PPE:

High visibility vests;; Retro-reflective stripes (for night work);

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

keep all equipment as far off road pavement as possible. Use traffic cones or barricades if needed.

6. Natural Biological Hazards

Watch for ticks, bees and other stinging insects, poisonous plants

Risk: low

Site Specific Primary Controls:

If hazardous insects or plants such as ticks, poison oaks are identified or suspected in a work area, controls including the use of disposable (Tyvek) coveralls, insect repellent (23.8% DEET or similar), light colored clothing, barrier creams, frequent tick checks should be implemented. Additionally, all field clothing and equipment should be thoroughly cleaned, removed and/or segregated from clean clothing, equipment and supplies to avoid transfer of hazardous plants/insects. All employees should bath immediately following fieldwork and use soaps/cleansers designed to remove oils associated with poison oak, and conduct a full body tick check using a mirror.

Required Trainings:

Natural Biological Hazards Awareness Training (AECOM)

Key SOPs:

S3NA-313-PR Wildlife, Plants and Insects

PPE:

Wear long pants and shirts; deterrents

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

AECOM Activities and Hazards

Remediation subcontractor oversight, record keeping, monitoring subcontractor decon and IDW management.

Hazards

1. Contaminated Materials Handling (debris, soils, liquids, etc.)

Soil and groundwater may contain low levels of petroleum and chlorinated hydrocarbons. If and soil, gw, and decon materials are generated as IDW to be drummed by subcontractors

Risk: medium

Site Specific Primary Controls:

Avoid direct contact, use tools whenever possible. Decontaminate and dispose of contaminated tools/equipment. Stand upwind of contaminated materials.

Required Trainings:

HAZWOPER 40hr, 8hr Respiratory Protection Fit Test Respiratory/Asbestos Medical Clearance

Key SOPs:

S3NA-519-PR Respiratory Protection Program S3NA-602-PR Expoure Monitoring S3NA-605-PR Medical Surveillance Program

PPE:

Chemical resistant gloves (per HASP requirements), chemical resistant clothing, respiratory protection.
All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

2. Spills or releases (existing - HAZWOPER)

The Korkay site is a listenn NYS inactive hazardous waste site

Risk: medium

Site Specific Primary Controls:

Refer to the HASP

Required Trainings:

HAZWOPER 8-Hour Refresher Training

Key SOPs:

S3NA-509-PR Hazardous Waste Operations and Emergency Response

PPE:

As per the HASP
All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Storing or Staging Materials and Supplies

ISCO equipment and materials will be stages onsite for the week.

Risk: medium

Site Specific Primary Controls:

Secure against tipping/falling. Store heavy items low, clearly identify materials. Store items out of travel paths to prevent trip creation of trip hazards.

Required Trainings:

Workplace Housekeeping Awareness Training

Key SOPs:

S3NA-307-PR Housekeeping, Worksite

PPE:

Leather work glove, safety glasses, hard hat when overhead hazards exist.
All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

Watch for trip hazards, especially cords, hoses, etc.

4. Walking (flat even terrain)

Walk around site to monitor subcontractor work.

Risk: low

Site Specific Primary Controls:

Walk at a steady even pace, do not run or rush. Do not carry items that impede visibility, use handrails, trekking poles or other aid to reduce stress on legs and prevent falls.

PPE:

As required by task, Trekking poles or similar (as appropriate for task)
All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Client Requirements and other Controls

Approval Log

Name	Outcome/Comments	Timestamp	
Howard, Walter	Approved	7/29/2015	10:57:36 AM
Wolf, Gerlinde	Approved	7/29/2015	2:48:42 PM

Sign Off Log

Name	Outcome/Comments	Timestamp	
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Field Team Conducting this Task

(sign here on hardcopy if names are not included in log above)

Name	Signature	Company	Date
Gerlinde Wolf		AECOM	

The THA is your field visit tool:

- All crew members need to review, understand, and sign the THA prior to work commencing.
- Keep the THA in a central location on site (e.g. the truck) to review daily during your tailgate meeting and update as required.

Emergency Response Plan

Refer to On-site Emergency Response Procedures

**Do you need to add additional information or file attachments to this approved THA?
 Click the button below to view the Amendments page.**

Open Amendments page

If you wish to use this THA for another task, you can make a copy by clicking below. The copy will appear in the "Saved but not Submitted" library.

Copy this THA

Task Hazard Analysis



Project Name	Korkay, Inc.	Project Number	60273289
Client	NYSDEC	Location	Latham
Start Date	7/28/2015	End Date	3/1/2018
Field Supervisor	McCredy, Ross	Project Manager	Howard, Walter
Region	US - North	Business Line	Environment
Task Name	Survey Oversight	Task Frequency	One Time

Associated Safe Work Plan, Health and Safety Plan or other project safety plan:

HASP, Korkay Site, 70 West Main Street, Broadalbin, NY

Job Events

<p>Travel</p> <p>Drive in personal, rented, or company vehicle to/from site to home/hotel</p> <p>Hazards</p> <p>1. Driving, vehicle</p> <p>Normal local traffic</p> <p>Risk: medium</p> <p>Site Specific Primary Controls:</p> <p>Complete a pre-use visual inspection. No hand-held electronic devices. Be aware of road conditions and drive only to your comfort level.</p> <p>Required Trainings:</p> <p>Vehicle and Driver Awareness eLearning (AECOM)</p> <p>Key SOPs:</p> <p>S3NA-005-PR Driver and Vehicle Safety Program; S3NA-205-PR, Equipment Inspections</p> <p>PPE:</p> <p>Have a radio, cell phone or other communication device for emergency use</p> <p><i>All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.</i></p> <p>Modifications to Site Specific Controls/Comments:</p> <p>All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.</p>

<p>Existing Site Hazards</p> <p>Heat or Sun Exposure, Vehicular Traffic(working near road and moving between locations), Slips/trips/falls, biological factors, weather hazards</p> <p>Hazards</p> <p>1. Heat or sun exposure</p> <p>Low risk outside of summer months</p> <p>Risk: medium</p> <p>Site Specific Primary Controls:</p> <p>Buddy system; heat stress monitoring; heat stress control plan (including shelters, work rotation, methods of cooling)</p> <p>Required Trainings:</p> <p>Heat Stress Awareness Training</p> <p>Key SOPs:</p> <p>S3NA-511-PR Heat Stress Prevention</p>
--

PPE:

Hat; sunglasses; extra water; sunscreen

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Slip, trip, fall

unfamiliar walking terrain, large area to cover with variable surfaces

Risk: medium

Site Specific Primary Controls:

Take inventory of your surroundings noting any conditions which may pose a slip, trip or fall hazard. Clear and walk your pathway prior to work beginning. Make any corrective actions to eliminate hazards, erect barricades or place warning signs and cones to raise awareness to hazards that can't be engineered out. Evaluate work area and access routes for locations where fall prevention may be beneficial to field staff. Install low or zero-impact fall protection (e.g., stake-supported railings, cable, or ropes) as appropriate to provide handholds. Maintain strong housekeeping habits. Keep worksites clean and free from debris, spills or other slip/trip hazards.

Key SOPs:

S3NA-307-PR Housekeeping, Worksite

PPE:

Footwear appropriate to the site

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

4. Eye exposure to protruding/ poking objects

Mainly vegetation in uncleared areas

Risk: medium

Site Specific Primary Controls:

Inspect work area for protruding objects that can poke employees; remove poking hazards when possible or proceed through work area taking steps to clear protrusions from the path of travel by hand (i.e. twigs/branches when conducting surveys in wooded areas).

Required Trainings:

PPE Awareness

Key SOPs:

S3NA-208-PR

PPE:

Tight fitting/foam sealed (Rx) Safety Glasses or Goggles (over Rx glasses)

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

5. Natural Biological Hazards

Risk: low

Site Specific Primary Controls:

If hazardous insects or plants such as ticks, poison oaks are identified or suspected in a work area, controls including the use of disposable (Tyvek) coveralls, insect repellent (23.8% DEET or similar), light colored clothing, barrier creams, frequent tick checks should be implemented. Additionally, all field clothing and equipment should be thoroughly cleaned, removed and/or segregated from clean clothing, equipment and supplies to avoid transfer of hazardous plants/insects. All employees should bath immediately following fieldwork and use soaps/cleansers designed to remove oils associated with poison oak, and conduct a full body tick check using a mirror.

Required Trainings:

Natural Biological Hazards Awareness Training (AECOM)

Key SOPs:

S3NA-313-PR Wildlife, Plants and Insects

PPE:

Wear long pants and shirts; deterrents

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

6. Exposure, Cold or Snow

Only Issue in Winter

Risk: low

Site Specific Primary Controls:

Work in pairs; review prevention, symptoms and treatment guidelines for hypothermia and frost bite; plan work in accordance with ACGIH work-warming schedules

Required Trainings:

Cold Stress Prevention Awareness Training

Key SOPs:

S3NA-505-PR Cold Stress Prevention

PPE:

Layers of clothing; thermal hand, face, body and foot protection

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

7. Traffic (working around moving traffic; non-roadways/highways)

Moving between locations

Risk: medium

Site Specific Primary Controls:

Maintain a safe distance from moving vehicles/equipment, visual contact with drivers and operators. Stage activities away from vehicles and paths of travel.

Required Trainings:

Traffic Safety Awareness Training (AECOM)

PPE:

High visibility vests, traffic control and warning devices as needed.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

AECOM Activities and Hazards

Contaminated Material Handling, Sharp Objects/Tools, Traffic

Hazards

1. Contaminated Materials Handling (debris, soils, liquids, etc.)

Low level of concentrations of chlorinated solvents in groundwater

Risk: medium

Site Specific Primary Controls:

Avoid direct contact, use tools whenever possible. Decontaminate and dispose of contaminated tools/equipment. Stand upwind of contaminated materials.

Required Trainings:

HAZWOPER 40hr, 8hr Respiratory Protection Fit Test Respiratory/Asbestos Medical Clearance

Key SOPs:

S3NA-519-PR Respiratory Protection Program S3NA-602-PR Expoure Monitoring S3NA-605-PR Medical Surveillance Program

PPE:

Chemical resistant gloves (per HASP requirements), chemical resistant clothing, respiratory protection.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition

shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

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2. Sharp Objects/Tools (handling and use)

System components are metal, glass, and plastic. Bottleneck in glass and easily breakable.

Risk: medium

Site Specific Primary Controls:

Avoid direct contact with sharp objects, use only safety - approved cutting tools. Observe location of hands/fingers in relation to sharp object/tool.

PPE:

Gloves, as per required by task

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

All PPE shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

3. Traffic (working around moving traffic; non-roadways/highways)

Walking from boring to boring, to vehicle alongside busy road.

Risk: medium

Site Specific Primary Controls:

Maintain a safe distance from moving vehicles/equipment, visual contact with drivers and operators. Stage activities away from vehicles and paths of travel.

Required Trainings:

Traffic Safety Awareness Training (AECOM)

PPE:

High visibility vests, traffic control and warning devices as needed.

All Personal Protective Equipment shall be inspected prior to use. Any PPE or equipment not in safe working condition shall be marked and removed from service.

Modifications to Site Specific Controls/Comments:

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Client Requirements and other Controls

Approval Log

Name	Outcome/Comments	Timestamp
11:01:25 AM	Approved	McCredy, Ross 7/29/2015
11:04:38 AM	Approved	

Sign Off Log

Name	Outcome/Comments	Timestamp
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Field Team Conducting this Task

(sign here on hardcopy if names are not included in log above)

Name	Signature	Company	Date

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Emergency Response Plan

Refer to On-site Emergency Response Procedures

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Attachment B

Safety Data Sheets

1. Identification

Product identifier	PersulfOx®
Other means of identification	None.
Recommended use	Soil and Groundwater Remediation.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Company Name	RegenesiS
Address	1011 Calle Sombra San Clemente, CA 92673
Telephone	949-366-8000
E-mail	CustomerService@regenesiS.com
Emergency phone number	CHEMTREC® at 1-800-424-9300 (International)

2. Hazard(s) identification

Physical hazards	Oxidizing solids	Category 3
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Sensitization, respiratory	Category 1
	Sensitization, skin	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
OSHA defined hazards	Not classified.	

Label elements



Signal word Danger

Hazard statement May intensify fire; oxidizer. Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation.

Precautionary statement

Prevention

Keep away from heat. Keep/Store away from clothing and other combustible materials. Avoid breathing dust. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/eye protection/face protection. In case of inadequate ventilation wear respiratory protection.

Response

If swallowed: Call a poison center/doctor if you feel unwell. If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. Rinse mouth. If skin irritation or rash occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. If experiencing respiratory symptoms: Call a poison center/doctor. Take off contaminated clothing and wash before reuse. In case of fire: Use appropriate media to extinguish.

Storage

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

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)

None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Silicic Acid, sodium salt, sodium silicate	1344-09-8	≤10
Sodium Persulfate	7775-27-1	≥90

Composition comments All concentrations are in percent by weight unless otherwise indicated.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
Skin contact	Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions.
Eye contact	Do not rub eyes. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Never give anything by mouth to a victim who is unconscious or is having convulsions. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.
Most important symptoms/effects, acute and delayed	Irritation of eyes. Exposed individuals may experience eye tearing, redness, and discomfort. Dusts may irritate the respiratory tract, skin and eyes. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. Contact with combustible material may cause fire. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water spray, fog (flooding amounts).
Unsuitable extinguishing media	Do not use water unless flooding amounts are available. Material reacts with water. Do not use carbon dioxide or other gas filled fire extinguishers; they will have no effect on decomposing persulfates.
Specific hazards arising from the chemical	Greatly increases the burning rate of combustible materials. Containers may explode when heated. During fire, gases hazardous to health may be formed. Combustion products may include: sulfur oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers.
Specific methods	Cool containers exposed to flames with water until well after the fire is out. Avoid dust formation.
General fire hazards	May intensify fire; oxidizer. Contact with combustible material may cause fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep away from clothing and other combustible materials. Wear appropriate protective equipment and clothing during clean-up. Avoid inhalation of dust. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
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Methods and materials for containment and cleaning up

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Collect dust using a vacuum cleaner equipped with HEPA filter. If sweeping of a contaminated area is necessary use a dust suppressant agent which does not react with the product. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Ventilate the contaminated area. Stop the flow of material, if this is without risk. Spillage collected should be monitored for signs of reaction or decomposition (fuming/smoking). If spilled material is wet, dissolve with large quantity of water.

Large Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Minimize dust generation and accumulation. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. Place all material into loosely covered plastic containers for later disposal. For waste disposal, see section 13 of the SDS. Wear appropriate protective equipment and clothing during clean-up.

Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Keep away from heat. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Avoid contamination. Wear appropriate personal protective equipment (See Section 8). Avoid breathing dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Do not taste or swallow. When using, do not eat, drink or smoke. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Do not store near combustible materials. Store away from incompatible materials (see Section 10 of the SDS). Recommended storage temperature: less than 40°C.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium Persulfate (CAS 7775-27-1)	TWA	0.1 mg/m3

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. If engineering measures are not sufficient to maintain concentrations of dust particulates below the Occupational Exposure Limit (OEL), suitable respiratory protection must be worn. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection

Use dust-tight, unvented chemical safety goggles when there is potential for eye contact.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier. Frequent change is advisable. Rubber, neoprene or PVC gloves are recommended.

Other

Wear appropriate chemical resistant clothing.

Respiratory protection

Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Respirator type: approved respirator with P100 filters.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state	Solid.
Form	Free-flowing powder
Color	White.
Odor	Odorless.
Odor threshold	Not available.
pH	11.5 (10% suspension/water) (10 % solution, 77 °F (25 °C))
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not applicable.
Evaporation rate	Not available.
Flammability (solid, gas)	Oxidizer.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	1.5 - 1.8 (68 °F (20 °C))
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Decomposition will occur upon heating.
Viscosity	Not available.
Other information	
Flammability	Non-combustible.

10. Stability and reactivity

Reactivity	Greatly increases the burning rate of combustible materials.
Chemical stability	Decomposes on heating.
Possibility of hazardous reactions	Oxidizing, avoid contact with reducing agents.
Conditions to avoid	Heat. Contact with incompatible materials. Avoid dust formation.
Incompatible materials	Acids. Bases. Combustible material. Reducing agents. Metals. Organic compounds.
Hazardous decomposition products	Oxygen. Sulfur oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause allergy or asthma symptoms or breathing difficulties if inhaled. Dust may irritate respiratory system.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.
Ingestion	Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Severe eye irritation. Dusts may irritate the respiratory tract, skin and eyes. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.

Information on toxicological effects

Acute toxicity Harmful if swallowed. May cause allergic respiratory and skin reactions. May cause respiratory irritation.

Components	Species	Test Results
Silicic Acid, sodium salt, sodium silicate (CAS 1344-09-8)		
Acute		
<i>Oral</i>		
LD50	Rat	1280 mg/kg
Sodium Persulfate (CAS 7775-27-1)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	> 10000 mg/kg
<i>Inhalation</i>		
LC50	Rat	> 5.1 mg/l, 4 Hours
<i>Oral</i>		
LD50	Rat	895 mg/kg
Skin corrosion/irritation	Causes skin irritation.	
Serious eye damage/eye irritation	Causes serious eye irritation.	
Respiratory or skin sensitization		
Respiratory sensitization	May cause allergy or asthma symptoms or breathing difficulties if inhaled.	
Skin sensitization	May cause an allergic skin reaction.	
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.	
OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)		
Not listed.		
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	Not classified.	
Aspiration hazard	Not an aspiration hazard.	
Chronic effects	Prolonged exposure may cause chronic effects.	

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components	Species	Test Results
Silicic Acid, sodium salt, sodium silicate (CAS 1344-09-8)		
Aquatic		
Crustacea	EC50	Water flea (Daphnia magna) 247 mg/l, 4.2 days
Sodium Persulfate (CAS 7775-27-1)		
Aquatic		
Crustacea	EC50	Daphnia 133 mg/l, 48 hours
Fish		Bluegill (Lepomis macrochirus) 771 mg/l, 96 hours
Persistence and degradability	No data is available on the degradability of this product.	
Bioaccumulative potential	No data available.	
Mobility in soil	No data available.	

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number UN1479

UN proper shipping name Oxidizing solid, n.o.s. (Sodium Persulfate Mixture)

Transport hazard class(es)

- Class** 5.1
- Subsidiary risk** -
- Label(s)** 5.1

Packing group III

Environmental hazards

- Marine pollutant** No

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Special provisions 62, IB8, IP3, T1, TP33

Packaging exceptions 152

Packaging non bulk 213

Packaging bulk 240

IATA

UN number UN1479

UN proper shipping name Oxidizing solid, n.o.s. (Sodium Persulfate Mixture)

Transport hazard class(es)

- Class** 5.1
- Subsidiary risk** -

Packing group III

Environmental hazards No

ERG Code 5L

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number UN1479

UN proper shipping name OXIDIZING SOLID, N.O.S. (Sodium Persulfate Mixture)

Transport hazard class(es)

- Class** 5.1
- Subsidiary risk** -

Packing group III

Environmental hazards

- Marine pollutant** No

EmS F-A, S-Q

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes
	Delayed Hazard - No
	Fire Hazard - Yes
	Pressure Hazard - No
	Reactivity Hazard - Yes

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	Yes
--	-----

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.
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US state regulations**US. Massachusetts RTK - Substance List**

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Sodium Persulfate (CAS 7775-27-1)

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 12-February-2015

Revision date 02-April-2015

Version # 02

Further information HMIS® is a registered trade and service mark of the American Coatings Association (ACA).

HMIS® ratings Health: 2*
Flammability: 0
Physical hazard: 1

NFPA ratings



Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

1. Identification

Product identifier Oxygen Release Compound (ORC®)
Other means of identification None.
Recommended use Soil and Groundwater Remediation.
Recommended restrictions None known.
Manufacturer/Importer/Supplier/Distributor information
Company Name RegenesiS
Address 1011 Calle Sombra
 San Clemente, CA 92673

Telephone 949-366-8000
E-mail CustomerService@regenesiS.com
Emergency phone number CHEMTREC® at 1-800-424-9300 (International)

2. Hazard(s) identification

Physical hazards Not classified.
Health hazards Serious eye damage/eye irritation Category 2B
OSHA defined hazards Not classified.
Label elements
Hazard symbol None.
Signal word Warning
Hazard statement Causes eye irritation.
Precautionary statement
Prevention Wash thoroughly after handling.
Response 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 away from incompatible materials.
Disposal Dispose of waste and residues in accordance with local authority requirements.
Hazard(s) not otherwise classified (HNOC) None known.

3. Composition/information on ingredients
Mixtures

Chemical name	CAS number	%
Magnesium hydroxide	1309-42-8	60-70
Magnesium peroxide	1335-26-8	30-40
Dipotassium Phosphate	7758-11-4	<3
Monopotassium Phosphate	7778-77-0	<3
Magnesium oxide	1309-48-4	<1

Composition comments All concentrations are in percent by weight unless otherwise indicated.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact Remove contaminated clothing and shoes. Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	If you feel unwell, seek medical advice (show the label where possible). Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Small fires: Dry chemical powder. Larger fires: Water spray, fog or foam.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: magnesium oxide, potassium oxide, phosphorus compounds.
Special protective equipment and precautions for firefighters	Use protective equipment appropriate for surrounding materials.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials. Use water spray to keep fire-exposed containers cool.
General fire hazards	No unusual fire or explosion hazards noted. The product itself does not burn.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Avoid contact with spilled material. Avoid contact with eyes. For personal protection, see Section 8 of the SDS.
Methods and materials for containment and cleaning up	<p>Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Sweep up or vacuum up spillage and collect in suitable container for disposal. Following product recovery, flush area with water.</p> <p>Small Spills: Wipe up spilled material and place in a suitable container for disposal. Clean surface thoroughly to remove residual contamination.</p> <p>Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.</p>
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Avoid dust formation. Use with adequate ventilation. Observe good industrial hygiene practices. Wear appropriate personal protective equipment (See Section 8).
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store in a cool, dry, well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS). Keep away from extreme heat and strong oxidizing agents.

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station and safety shower.
Individual protection measures, such as personal protective equipment	
Eye/face protection	Use safety glasses. Where contact with eyes is likely, use chemical goggles. Use a face shield as needed.

Skin protection	
Hand protection	Wear appropriate chemical resistant gloves.
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment. If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Wear respiratory protection during operations where spraying or misting occurs. If respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state	Solid.
Form	Powder.
Color	White.
Odor	Odorless.
Odor threshold	Not available.
pH	11 (3% suspension/water)
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not applicable.
Evaporation rate	Not available.
Flammability (solid, gas)	Not flammable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	None.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Slightly soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Bulk density	0.5 - 0.9 g/ml

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions. Decomposes on heating.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials. High temperatures.

Incompatible materials Reducing agents. Strong acids.
Hazardous decomposition products Thermal decomposition or combustion may produce: magnesium oxide, potassium oxide, phosphorus compounds.

11. Toxicological information

Information on likely routes of exposure

Inhalation Prolonged inhalation may be harmful.
Skin contact Prolonged or repeated skin contact may result in minor irritation.
Eye contact Causes eye irritation.
Ingestion Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics May cause temporary eye irritation. Exposed individuals may experience eye tearing, redness, and discomfort.

Information on toxicological effects

Acute toxicity Not expected to be acutely toxic.

Components	Species	Test Results
Magnesium hydroxide (CAS 1309-42-8)		
Acute		
<i>Oral</i>		
LD50	Rat	8500 mg/kg

Skin corrosion/irritation Prolonged skin contact may cause temporary irritation.

Serious eye damage/eye irritation Causes eye irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.
Skin sensitization This product is not expected to cause skin sensitization.

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.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability The product contains inorganic compounds which are not biodegradable.

Bioaccumulative potential No data available.

Mobility in soil Not established.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not listed.

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

Not Listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	14-May-2015
Revision date	-
Version #	01
Further information	HMIS® is a registered trade and service mark of the American Coatings Association (ACA).
HMIS® ratings	Health: 1 Flammability: 0 Physical hazard: 0

NFPA ratings**Disclaimer**

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

Attachment C

Applicable SH&E SOPs

Vehicle and Driver Safety Program

1.0 Purpose and Scope

- 1.1 This procedure applies to employees who operate motor vehicles that are owned, rented, or leased by AECOM and to employees who use personal, client or government-supplied vehicles while conducting AECOM business. This Vehicle and Driver Safety Program applies to AECOM Americas operations. Policies and procedures related to the operation of commercial motor vehicles are in addition to this procedure, see *S3NA-404-PR1 Commercial Motor Vehicles*. Operational procedures related to the use of AECOM owned vehicles are addressed in the *Americas Fleet Vehicle Operations Policy*.
- 1.2 Vehicle and transportation related death is among the leading causes of death in the United States. In the occupational setting, motor vehicle crashes are the number one cause of death.
- 1.3 Vehicle damage and damage to property by vehicles are generally avoidable incidents that can result in injuries and added costs for repairs and replacements.

2.0 Terms and Definitions

- 2.1 **Americas Fleet Vehicle Management** – The team of AECOM employees who oversee the operations, safety, and performance of the Americas Fleet.
- 2.2 **Authorized Driver** – AECOM employees who have provided proof of a current driver's license, proof of insurance and completed AECOM Driver & Vehicle Safety Training. Employees authorized to operate an AECOM Fleet Vehicle must receive additional approval by Region Fleet Vehicle Coordinators. Refer to *Americas Fleet Vehicle Operations Policy*.
- 2.3 **Commercial Motor Vehicle (CMV)** – For AECOM operations, a CMV is defined as a vehicle used for AECOM business that:
- ≥10,001 lbs gross vehicle weight rating (GVWR); and/or
 - Carries a quantity of hazardous material (quantities ≥ 1001 lbs. combined total weight) at any time beyond the criteria in 49 CFR 173.6 (Materials of Trade).
- 2.4 **Company Business** – Any activity that is performed in the name of the company. This includes vehicle travel between work locations, client sites, meeting locations as well as driving performed as a part of work related travel (driving to and from airports, hotels, train stations). Company business does not include driving that is a part of a routine commute from home to an office location.
- 2.5 **Distractions Driving** – An activity that takes the driver's attention away from the primary task of driving.
- 2.6 **Driving Under the Influence (DUI)/Driving While Intoxicated (DWI)** – DUI is the operation of a vehicle on company business under the influence of alcohol, drugs, medications, or other substances capable of inducing an altered mental state and/or impairing physical and mental judgments such that the influence of said substances produces impairment in violation of governmental laws for the location of the impairment.
- 2.7 **Fatigue** – A general term used to describe the experience of being "sleepy", "tired" or "exhausted". The effect of fatigue is both a physiological and a 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 a drivers can also suffer from fatigue even on short trips.
- 2.8 **Fleet Vehicle** – A motorized vehicle owned or leased by AECOM. These vehicles may be assigned to a specific driver or may be part of an office vehicle pool.
- 2.9 **IndustrySafe** – AECOM's internal database for the management of safety, health and environmental incidents. IndustrySafe is accessible to all AECOM employees, and maintains confidentiality for protected information.

- 2.10 **Journey Management** – A process for planning and executing necessary journeys safely.
- 2.11 **Local Laws** – Signs, postings, laws, regulations, ordinances and codes applicable for the jurisdiction in which the motor vehicle is being operated.
- 2.12 **Managers/Management** – All AECOM company personnel with supervisory responsibilities or direct reports.
- 2.13 **Mobile Communication Device** – A mobile electronic device that is used to receive or communicate voice, email, internet, and/or public media. The device requires user interaction (typing, dialing, reading, keying, etc.) that distracts the motor vehicle operator. Example devices include, but are not limited to:
 - Mobile/Cellular phones
 - Personal Data Assistant (PDA)
 - iPads, iPods, or other tablet models
 - Computers
 - Global Positioning System receivers
- 2.14 **Motor Vehicle Report (MVR)** – A listing of the tickets (violations), incidents collision for an individual driver over a period of time (e.g. 3 years, 5 years) provided by a state or provincial authority such as the Department of Motor Vehicles.
- 2.15 **Personal Vehicle** – A motorized vehicle owned or leased by an employee.
- 2.16 **Spotters** – Extra personnel that may provide guidance when maneuvering in close and/or complex situations in order to avoid the occurrence of an incident.
- 2.17 **Task Hazard Analysis (THA)** – A process for planning and evaluating tasks, such as driving, for hazards and control measures to reduce and eliminate the risk of a harmful event.
- 2.18 **Vehicle Incident** – An incident, for the purposes of this procedure, is a vehicle collision or other vehicle related event where personal injury or property damage occurs. This includes theft, vandalism, and criminal mischief. Citations are considered incidents when the citation is received during the course of business and results in a restricted or suspended license, a governmental motor vehicle agency assigning points to the employee's license, or the employee provides AECOM's insurance as proof of insurance at the time of incident.

3.0 References

- 3.1 AECOM US, Canada and South America Employee Handbook (HR Department)
- 3.2 Americas Fleet Vehicle Operations Policy
- 3.3 AECOM Global Travel Policy
- 3.4 National Safety Council
- 3.5 Smith Systems
- 3.6 WP-001-PR Firearms Standard
- 3.7 S2-032-PR1 Weapons Safety
- 3.8 S3NA-003-PR1 SH&E Training
- 3.9 S3NA-004-PR1 Incident Reporting
- 3.10 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.11 S3NA-404-PR1 Commercial Motor Vehicles
- 3.12 S3NA-603-PR1 Incident Investigation and Review

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Regional Executive

- Supports the implementation of the *Americas Fleet Vehicle Operations Policy*, including preventative maintenance, vehicle disposition and insurance.
- Providing necessary resources to manage vehicles and drivers to the extent their operation requires.

4.1.2 Supervisor

- Confirming employees are informed of the provisions of this procedure and related vehicle procedures.
- Providing a copy of this procedure to an employee who will be driving an AECOM owned, leased or personal vehicle for company business.
- Verifying that each employee has completed *S3NA-005-FM1 Driver's Authorization* per the instructions on the form.
- Allowing employees to designate time to complete required driving safety training, vehicle inspections and related activities.
- Assigning driving tasks to authorized employees only.
- Selecting and providing vehicles for use by authorized employees that are appropriate for the planned working conditions and environment.
- Supporting employees in the reporting of vehicle incidents per *S3NA-004-PR1 Incident Reporting*, including the entry of the incident into IndustrySafe.

4.1.3 Employee

- Following this procedure and applicable laws while operating a vehicle.
- Completing required training consistent with the training needs assessment and requirements per the *S3NA-003-PR1 SH&E Training*.
- Reporting to their supervisor if the vehicle selected is not appropriate for working conditions and environment.
- Reporting to their supervisor if they are inexperienced in operating the type of vehicle they are assigned.
- Reporting to their supervisor if they are inexperienced driving in the type of working conditions and environment they are assigned.
- Review the Driving THA and prepare a Journey Management Plan by completing the *S3NA-005-TP1 Journey Management Plan*.
- Immediately reporting vehicle incidents per *S3NA-004-PR1 Incident Reporting*, including the entry of the incident into IndustrySafe.
- Notifying their Supervisor, Region SH&E Manager, and Region Counsel upon receipt of a legal summons associated with a moving violation related to the use of a company vehicle.
- Immediately reporting a change or limitation(s) to his or her Driver's License to his or her Supervisor.
- Conducting a pre-operational inspection of the vehicle for damage or deficiencies and reporting discovered deficiencies affecting the safe operation of the motor vehicle to the appropriate authority (Region Fleet Vehicle Coordinator, Rental Car Agency or other).

4.1.4 **Region SH&E Manager / SH&E Department**

- Maintaining and updating resources for Driver Safety Training
- Maintaining this procedure and updating it when regulatory or company policies dictate.
- Assisting operational leaders with determining the risk incurred by the use of motor vehicles.
- Participating in the incident investigation and review process.

4.1.5 **Region Fleet Vehicle Coordinator (in their assigned regions)**

- Escalating safety issues related to fleet vehicles for resolution through the Fleet Management Company.
- Disposing of fleet vehicles per the guidance in the *Americas Fleet Vehicle Operations Policy*.
- Refer to the Region SH&E Manager for Fleet Vehicle driver training verification and risk assessment.

4.1.6 **Region Human Resources Manager**

- Responsible for verifying license and proof of personal vehicle insurance at the time of hire and upon verification of the Driver Authorization Form.

4.2 General Procedures and Practices

- Only Authorized Drivers are to operate a motor vehicle (rental, personal, or AECOM owned/leased) while on AECOM business, refer to *S3NA-005-W11 Authorized Driver Safety Practices*.
- Drivers must comply with *AECOM's Global Travel Policy*, *Americas Fleet Vehicle Operations Policy*, and the applicable laws. (NOTE: *Individual state, provincial, and local laws vary.*)
- AECOM Fleet Vehicles and Rentals Cars should not be operated if the age or mileage on that vehicle exceeds the following:
 - Light/Medium Duty Trucks: 72 months/150,000 miles
 - Sedans: 36 months/80,000
 - Sport Utility Vehicles/Vans: 60 months/100,000 miles
- Seat belts are to be worn by the occupants. The number of passengers shall not exceed the manufacturer's specifications for the vehicle.
- Motorcycles may not be operated on company business unless:
 - Specific approval is provided by the **Supervisor** with concurrence from the **Region SH&E Manager**.
 - A hazard analysis is completed.
 - Required training and license is in place.
 - Headlights or daytime running lights will be used when the vehicle is in operation. Class 2 or 3 safety vest worn while operating a motorcycle.
- Fire arms and weapons are not permitted in AECOM Fleet Vehicles or rental vehicles insured by AECOM. Firearms and weapons in personal vehicles are subject to the laws and regulations of the respective local, provincial, state, territory, federal and region and/or country. In accordance with the Global Safety Department standards, no firearms or weapons are allowed to be used without express permission by the **Region Executive** and **Chief Security Officer**, refer to the *WP-001-PR Global Firearms Standard*. Exceptions can be made in writing from the **Region Executive** and **Chief Security Officer** if knives or weapons are required as part of the work activity or for third party protection and planned for appropriate hazard control measures and training, refer to the *S2-032-PR1 Weapons Safety*. Vehicles are to be selected based on the nature of planned use. In some working conditions, four-wheel drive and higher clearance vehicles may be required to ensure safe travel. Vehicle requirements/specifications must be identified in the project specific safety plan or THA.

- Vehicles are to be outfitted with the appropriate support equipment based on the THA or client vehicle specifications. Support equipment may include cones, rotating warning lights, warning flags, vehicle identification (magnetic door signs or similar), wheel chocks, cargo nets, rollover protection.
- Drivers are to operate vehicles in a manner that avoids situations where backing is necessary. Reverse parking of all vehicles while on business is required. Backing of trucks and heavy equipment requires then a spotter to assist the driver in avoiding collisions.
- Non-AECOM drivers (subcontractors, joint venture partners, clients) are prohibited from operating an AECOM leased or owned vehicle unless the activity is specifically agreed to in the applicable contract and only if the use of the vehicle is consistent with the terms of the contract.

4.3 Distracted Driving

The use of all mobile communication devices (MCDs) while driving is strictly prohibited. MCDs include all hand-held or hands-free devices, including all mobile phones and other portable electronic devices that cause driver distraction such as tablets (e.g., iPads), PDAs, pagers, iPods, MP3s, GPS, DVD players, laptops, etc. Employees shall not use a personal or company MCD while driving a company vehicle; use a company MCD while driving a personal vehicle; or use a personal MCD while driving a personal vehicle on company business. Driving includes the time spent in traffic or while stopped at red lights or stop signs.

GPS units and GPS units on smart phones 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.

4.4 Impairment

- Impairment can take many forms ranging from fatigue, to the use of prescription medication or alcohol (even small amounts), to the abuse use of illegal and legal drugs and alcohol. AECOM **Employees** are not to drive in an impaired condition.
- AECOM **employees** are prohibited from being under the influence of alcohol or drugs or improperly using medication in a way that could diminish, or raise questions concerning, an employee's ability to perform at his or her best while performing services for or on behalf of AECOM.
- AECOM **Employees** are prohibited from operating a vehicle if they are experiencing signs and symptoms of fatigue. **Employees** should stop work and rest before driving. No **Employee** should operate a vehicle if they have worked 14 consecutive hours within a 24 hour period.

4.5 Task Hazard Analysis (THA)

All **Employees** are to review a Driving THA prior to driving for company business, refer to *S3NA-209-PR1 Project Hazard Assessment and Planning*.

4.6 Journey Management

Journey Management is a process for planning and executing necessary journeys safely. Journey Management includes the following steps:

- Determining if the trip is necessary;
- Evaluating alternative safer modes of transport;
- Evaluating the potential to combine journeys with others.

Trips in excess of 100 miles (160 kms) (each way), or into remote or hazardous areas, or when otherwise deemed necessary, shall have a Journey Management Plan (JMP). This plan typically includes the route, location of route hazards, timing, rest periods and locations, communications, emergency response and security arrangements.

A sample Journey Management Plan has been provided in *S3NA-005-TP1 Journey Management Plan*.

Drivers are responsible for developing the Journey Management Plan in coordination with their **Supervisor**, **Project Manager** and **Region SH&E Manager** (as appropriate).

4.7 Driver Safety Training

- Driver safety training is to be assigned based on the risks posed with the work environment and vehicle type, using the training needs assessment process, refer to *S3NA-003-PR1 SH&E Training*. A determination of training type is at the discretion of the **Supervisor**, the following guidance will be applied:
- Driver Safety Awareness – is appropriate for Authorized Drivers who periodically use their personal vehicle, AECOM Fleet Vehicle or rental car for AECOM business. Driver Safety Awareness training is an eLearning module approximately 1 Hour in length.
- Defensive Driver (online) – is appropriate for authorized drivers who are assigned an AECOM Fleet Vehicle or rental vehicle for a significant period of time with the expectation that the **Employee** utilizes the vehicle on a regular basis for AECOM business. Defensive Driver training is provided online through one of the following AECOM-approved training resources:
 - The National Safety Council
 - Alert Driving
- Defensive Driver (hands-on) – is appropriate for Authorized Drivers who drive in remote locations, hazardous environments (such as refineries, ports, terminals etc.), at-risk drivers, and as required by clients. Defensive Driver hands-on training is provided through one of the following AECOM-approved training resources such as Smith Systems. Hands on defensive driver training may also be required as a result of an incident or negative Motor Vehicle Report.
- Driver Retraining – Drivers involved in repeated motor vehicle incidents, incidents of sufficient severity or concern, or drivers identified as at-risk through AECOM's Motor Vehicle Report/Driver Abstract process shall be subject to a driver retraining program that may include any of the above programs or other training programs appropriate for the type of driving the employees performs. Retraining programs will be implemented at the discretion of the **Supervisor** and **Region SH&E Manager** Depending on the severity of the incident, the **Employee** may be subject to disciplinary and refused the right to drive on behalf of AECOM.
- Special Vehicles and Driving Conditions – Vehicles such as All-Terrain Vehicles (ATVs), four wheel drive vehicles, motorized carts, box vans and trailers (towing) require specialized training and supervision. Use of these types of vehicles is limited to AECOM projects, therefore training and qualification programs for drivers will be project specific. The **Project Manager** shall work with the **Region SH&E Manager** to tailor training to the specific needs of the project.

4.8 AECOM Fleet Vehicles (additional requirements)

- The requirements of this procedure apply to the use of AECOM Owned or Leased Vehicle, and additional requirements are set forth in the Americas Fleet Vehicle Operations Policy.
- Fleet Vehicles are to be parked on project sites in a manner that prevents the driver from backing (reversing) upon departure. For example, the vehicle should be backed into a parking spot or drivers should select a parking spot that allows them to “pull” through” so that the vehicle is facing the direction of departure.
- Fleet Vehicles are to have a “Safety Kit” that contains a first-aid kit, portable fire extinguisher, safety triangle, and two reflective safety vests. If not available, contact the **Region Fleet Vehicle Coordinator** about how to obtain one through the procurement system.

4.9 Personal Vehicles (additional requirements)

The requirements of this procedure apply to the use of a personal vehicle for company business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.10 Rental Vehicles (additional requirements)

The requirements of this procedure apply to the use of a rental vehicle for company business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.11 Requirements for Authorized Drivers

- Review the *S3NA-005-W11 Authorized Driver Safety Practices* for more specifics.
- Perform pre-operation vehicle inspections, a sample vehicle inspection checklist is provided in *S3NA-005-FM2 Vehicle Inspection Checklist*.
- Arrange for preventive maintenance services for the vehicle and maintain it in sound mechanical condition, per manufacturer's recommendations.
- Drivers are not to permit unauthorized persons to operate an AECOM owned/leased/rented vehicle.
- Do not operate the vehicle if unsafe maintenance conditions exist that would likely result in vehicle damage or personal injury. This applies to vehicles owned or leased by AECOM and to personally-owned vehicles used for company business. Escalate other maintenance issues for correction to appropriate authority (**Region Fleet Vehicle Coordinator**, Rental Car Agency, **Supervisor** etc.).
- Use AECOM owned or leased vehicles for business only. Exceptions to use the vehicle as transportation to and from work, parking at residences overnight, may be permitted only if written approval is obtained from the **Regional Executive**.
- Transport only persons on AECOM related business or those persons receiving transportation as a prescribed service. Only drive vehicles in conditions for which the driver has the appropriate training and experience.
- No smoking by the driver or passengers in the vehicle.
- Drivers are responsible for damage caused by abuse of the vehicle.
- Secure the vehicle when left unattended.
- Securing loads in the inside and outside compartments of the vehicle. Do not rely on weight/shape of load alone. Always use a cargo net, straps, containers or other mechanical device when necessary to ensure load is secure. Mark loads that extend the beyond the end of truck, trailer or similar edge with a red warning flag of at least 16 square inches.
- Refrain from modifying existing equipment (warning sounds, backing alarms etc.) and from installing aftermarket equipment including toolboxes, truck caps, specialty lights, or towing equipment) without approval from the **Regional Executive**, **Region Fleet Vehicle Coordinator**, and AECOM Procurement Department.
- Shut the engine off when refuelling the vehicle.

4.12 Emergency Preparedness

- The following suggested items should be kept in vehicles used for company business in remote project locations:
 - First Aid kit, appropriate to the work and crew size, or per regulations.
 - Fire extinguisher, safety triangle, and safety vest
 - Emergency equipment (e.g., flares, flashlight, blanket, drinking water, etc.) based on conditions.
 - Means of communication (cell phone, radio or satellite phone), extra batteries or a charger.
- To the extent possible, **Employees** should refrain from changing tires or making repairs to vehicles in the field. A road side assistance service should be identified for vehicles used for company business in advance travel.
- Specific emergency procedures are to be identified in the Journey Management Plan or the THA.

4.13 Vehicle Incidents

- Vehicle incidents are to be managed consistent with *S3NA-004-PR1 Incident Reporting*.
- For vehicle incidents that involve non-emergency injuries or potential injuries, **Employees** must call the Incident Reporting and Assistance Line at 1.800.348.5046 for connection with Work Care medical support. The **Employee** or **Supervisor** is responsible for making the initial notification into IndustrySafe within 4 hours of the event.
- For vehicle incidents that involve property damage greater than \$2,500, **Employees** are to call the Incident Reporting and Assistance Line at 1.800.348.5046 for connection with appropriate resources within AECOM, The **Employee** or **Supervisor** is responsible for making the initial notification into IndustrySafe within 4 business hours of the event.
- Non-critical and no-injury incidents (property damage less than \$2,500, near misses, etc.), the **Employee** or **Supervisor** is responsible for making the case entry into [IndustrySafe](#) by the end of the work shift (at least within 24 hours of the event).
- For Fleet Vehicles, employees must contact the AECOM Fleet Management Company (Wheels: 800-477-2211) to report the incident. Refer to the Americas Fleet Vehicle Operations Policy for further information. Vehicle incidents that result in property damage or loss greater than \$2,500 or cause injuries to AECOM **Employees** that result in medical treatment are to be investigated using the AECOM Incident Investigation Process in *S3NA-603-PR1 Incident Investigation and Review*.
- The **Employee(s)** involved in the incident are advised to:
 - Provide (if requested) to police and the other driver(s) their liability insurance information.
 - Not operate a damaged vehicle if its safety is questionable, its operating condition is illegal by applicable laws or its condition is such that further damage would likely result from its operation.
 - Cooperate with **Region Counsel** if the incident results in unresolved risks or third party claims, or if the **Employee** receives a Summons, Complaint or other legal documents relating to a traffic incident.
 - NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW. Statements made in haste or anger may be legally damaging.
 - **Employees** must report the incident to AECOM's Global Travel Department. If the incident involved a third party, the driver is responsible for obtaining a copy of the police report and providing to global travel

4.14 Drug and Alcohol Testing

- Testing for Alcohol and/or Drugs procedures are specified in the *US and Canadian Employee Handbook* and administered through the AECOM **Human Resources Department**.
- In the event that a police/regulatory officer responding to a vehicle incident administers field and/or laboratory impairment testing AECOM reserves the right to obtain copies of such testing results for inclusion in the incident report and consideration in a subsequent incident investigation.

4.15 Citations and Violations

- Citations and violations which occur while driving for company business are to be reported as a Vehicle incident, using *S3NA-004-PR1 Incident Reporting* within 24-hours.
- The **Employee** is personally responsible for payment of fines for moving violations and parking citations incurred while driving a vehicle on AECOM business and for reporting such Incidents to his/her **Supervisor, Region SH&E Manager, and Region Counsel**.
- If an Authorized Driver receives a citation for DUI/DWI/Operating Under the Influence, is suspended from driving or has his/her driver's license revoked, he/she is required to notify his/her **Supervisor** and

Region Fleet Vehicle Coordinator within 8 hours of the action. Failure to do this may result in disciplinary action up to and including termination.

5.0 Records

5.1 None

6.0 Attachments

- 6.1 S3NA-005-WI1 Authorized Driver Safety Practices
- 6.2 S3NA-005-FM1 Driver Authorization
- 6.3 S3NA-005-FM2 Vehicle Inspection Checklist
- 6.4 S3NA-005-TP1 Journey Management Plan

Authorized Driver Safety Practices

1.0 Before Vehicle Operation

- 1.1 Conduct a Pre-Trip *Vehicle Inspection*, S3NA-005-FM2.
- 1.2 Be familiar with applicable client rules and regulations when on the client's sites. The employee may, for example, be required to leave their keys in the ignition with the vehicle turned off or to display a vehicle pass. When parking, it is recommended that employees back the vehicle into the parking space.
- 1.3 Plan your travel to avoid being in a rush, traveling during peak traffic hours, and traveling through high traffic volume areas. Utilize the S3NA-005-TP1 *Journey Management Plan* as appropriate.

2.0 During Vehicle Operation

- 2.1 The Driver and all passengers must wear seatbelts at all times.
- 2.2 Maintain a safe distance when travelling behind other vehicles.
- 2.3 Confirm the area behind your vehicle is clear prior to and while reversing a vehicle.
- 2.4 When parking the vehicle on the edge of a roadway, turn on the four-way indicators (hazard lights) prior to leaving the vehicle. Use cones or other warning devices, and wear a high visibility traffic vest.
- 2.5 Observe extra caution in and around emergency and construction zones.
- 2.6 Avoid unattended rest areas, when possible, and especially at night.
- 2.7 If the vehicle breaks down, attempt to get to a secured location. Call police or roadside assistance as appropriate. Do not leave the vehicle.
- 2.8 Contact the police to help those with car trouble instead of stopping to assist. When possible, staff should have a car mechanic or roadside assistance change or repair a flat tire. If the Driver or passenger must change a tire, the Driver and passenger must adhere to the manufacturer's specifications and observe the proper lifting technique and safety procedures. Proper lifting is addressed in S3NA-308-PR1 *Manual Lifting, Field*.

3.0 24 – Hour Roadside Assistance, AECOM Fleet Vehicles only: Wheels: 800-477-2211

- 3.1 Authorized Drivers are to park Vehicles are to on project sites in a manner that prevents the driver from backing (reversing) upon departure. For example, the vehicle should be backed into a parking spot or the driver should select a parking spot that allows them to "pull" through" so that the vehicle is facing the direction of departure.
- 3.2 Authorized Drivers should use the "Get Out And Look" (GOAL) method before placing a vehicle in motion. Drivers are to make a 360-degree (360°) walk around of the vehicle immediately before placing vehicle into motion in order to determine whether there are hazards or possible obstructions in the proposed path of travel. Drivers are to clear the area of people and objects before placing the vehicle in motion. A check will also be performed to ensure overhead and side clearances are adequate. The following are recommended best practices:
 - Placement of cones on the right side of the front and rear of vehicle upon parking and retrieved during the 360° GOAL walk-around.
 - In lieu of cones, place GOAL magnets on the right side of the hood and truck/tailgate of the vehicle upon parking. The GOAL magnets should then be retrieved during the 360° GOAL walk around just prior to moving the vehicle again.

- Place a GOAL sticker on the driver side door window as a reminder to get out and look.

4.0 If Vehicle is to be Left Unattended

- 4.1 Turn the ignition off, remove the key and set the emergency brake (if parked on an incline).
- 4.2 Lock and secure the vehicle.
- 4.3 Secure equipment and property in a locked trunk or tool chest.
- 4.4 Do not leave keys in an unattended vehicle.

5.0 Staff shall Drive Defensively

- 5.1 Look ahead taking at least 15 seconds to visually identify if there is slowing traffic or another type of road hazard ahead or to your side. Don't drive behind vehicles that block your view.
- 5.2 Get the big picture and look for hazards (other motorists, pedestrians, cyclists, road debris, etc.)
- 5.3 Scan your mirrors every 5 – 8 seconds to look for hazards. Don't stare or fix your eyes on any one item for too long.
- 5.4 Leave yourself an out by monitoring your space in front, behind and to each side of the vehicle, leaving enough room as a cushion so that you can take evasive action if needed.
- 5.5 Be seen by all other drivers, pedestrians, cyclists and others using or crossing the road. Use your headlights and avoid driving in the blind spot of other vehicles. Make sure your horn works and use it to warn others.

6.0 Road Rage

- 6.1 Road rage is a dangerous driving situation that can occur and should be avoided whenever possible, but NEVER instigated. Do not get drawn into a confrontation. Avoid any confrontational eye contact or gestures.
- 6.2 The driver should be aware of the vehicles around them, paying frequent attention to the vehicle's mirrors.
- 6.3 Get out of the way. Even if the other motorist is speeding, it is safest not to make a point by staying in your lane. The other driver may be dealing with an emergency situation.
- 6.4 Unless it is necessary to use the horn as an alert, do so sparingly.
- 6.5 If someone is following you after an on-the-road encounter, drive to a public place or to the nearest police station and seek assistance.
- 6.6 Attempt to note the offender's license plate number and write it down as soon as it is safe to do so and the vehicle is not in motion.
- 6.7 Report any aggressive driving to the police immediately. This action may aid in preventing further occurrences by the same driver.

7.0 Work Trucks

- 7.1 When accessing any pickup truck box, staff will: step up into the box to avoid excess reaching and strain and; use three point contact getting in and out of the truck box (i.e., avoid jumping off the tailgate).
- 7.2 Be vigilant of differences between trucks and small cars related to blind spots, turning radius, and required overhead and undercarriage clearances.

8.0 Winter Driving

- 8.1 Clear snow from exterior vehicle surfaces.
- 8.2 Avoid using cruise control on icy roads.

- 8.3 Accelerate and brake gently to reduce skids or spinouts.
- 8.4 Wear winter clothing that does not restrict movement, vision or hearing.
- 8.5 Where required, have snow chains for the vehicle and be familiar with their installation.
- 8.6 Use extra caution while driving during hazardous winter conditions.
- 8.7 Avoid sudden changes of speed or direction to reduce possibility of skidding.
- 8.8 Drivers should leave extra distance between their vehicle and the vehicle ahead of them. Stopping on ice takes about eight times the distance that it takes on dry pavement.
- 8.9 Carry suitable warm clothing and emergency equipment during the winter months. Temperatures can plunge rapidly.
- 8.10 Be aware of icy patches on the road bridges and intersections that are especially prone to ice patches.
- 8.11 Be familiar with the skid control procedures for the type of vehicle being driven (i.e., front, rear or four-wheel drive).

9.0 Gravel Roads and Remote Locations

- 9.1 Prior to driving on a road with an assigned radio frequency, the passenger will test the two-way radio to confirm that the proper radio frequency is set, and that the transmission is being received clearly by other traffic. The passenger will operate the two-way radio.
- 9.2 Drivers will maintain appropriate speed for the road conditions.
- 9.3 Headlights will be used when operating the vehicle.
- 9.4 Drivers will respect the understood road protocol, drive defensively and respect intersections.
- 9.5 4WD options will be utilized at the discretion and comfort level of the driver. If road conditions are questionable even for 4WD use, the road will not be traveled and either another route found or the job postponed until road conditions improve.

10.0 Off-road

- 10.1 If inexperienced, seek supervisory advice and training.
- 10.2 Vehicles should only be driven off roads after other available options (e.g., use of ATV's, etc.) have been considered.
- 10.3 Prior to driving off-road, check to see that the vehicle is in good operating condition and your tires are properly inflated.
- 10.4 Realize the limitations of your vehicle and do not become over confident.
- 10.5 Seat belts should be kept fastened and loose objects in the vehicle securely fastened to prevent them from becoming projectiles in the event of a sudden stop.
- 10.6 Drive according to the ground conditions.
- 10.7 Speed and power are normally not required in rough off-road driving.
- 10.8 Learn to read the surrounding terrain. Monitor the ground conditions ahead of the vehicle -- it is essential to know what to expect in light of the road conditions.
- 10.9 When slowly traversing difficult areas of soft ground, try to keep the vehicle in motion. Once stopped it will be far more difficult to get the vehicle going again. If the vehicle becomes stuck, do not spin the wheels, as it will only dig in further or deeper until the vehicle chassis rests on the ground. Try to go slowly backwards in the vehicle's own tracks, as these have been previously compressed by the vehicle. In most cases this will

- be successful. If not, place appropriate material (e.g., wooden planks, mats, branches, etc.) under the wheel to improve traction.
- 10.10 Before driving over rough terrain, the terrain should be inspected on foot first.
- 10.11 When climbing hills in the vehicle go straight up or down. It is also smart to know what is on the other side of the hill before going up. At the base of the hill the driver should apply more power. Ease up on the power while approaching the top and before going over the crest. If the vehicle stalls on the ascent, back straight down the hill in reverse. For downhill travel in a vehicle with manual transmission, always use the lowest appropriate gear, and do not disengage the clutch to allow the vehicle to coast. If the vehicle is equipped with an automatic transmission, use low range and the lowest drive setting. **DO NOT** drive a hill at an angle this increases the risk for a roll-over incident. If the hill is very steep and you do not feel confident that your vehicle can make it up, then do not attempt it.
- 10.12 When driving through water, consider the maximum wading depth of the vehicle. The air intake must always be kept clear of water. Driving through water should always be done slowly to keep the bow wave low. In addition, slow speed prevents a hot engine from suffering tension cracks by sudden contact with cold water. Check the brakes after leaving the water.
- 10.13 Prior to returning to the road, do a vehicle inspection to confirm the vehicle is road worthy.

Americas

Driver Authorization

S3NA-005-FM1

Employee Name :	Employee Number:	Office or Project Location:	Date:
<p>NOTE: It is not a requirement to provide copies of your driver license or proof of insurance as an attachment to this form. Supervisors are responsible for validating these documents are accurately represented in this form.</p>			
Employee			
Driver's License Expirations Date			
Driver's License Number			
Proof of valid automobile insurance (for personal vehicle use only)		Check if Confirmed <input type="checkbox"/>	
<p>I acknowledge that I have read S3NA-005-Driver and Vehicle Safety and understand that it contains important information about AECOM's procedures regarding employee use of AECOM fleet, rental and personal vehicles. I agree to adhere to the requirements of the Procedure. _____ (Initial)</p> <p>As a condition of driving a vehicle on AECOM business I will present my driver's license and proof of insurance (personal vehicle only) for validation by my Supervisor. _____ (Initial)</p> <p>I understand as a condition to operating an AECOM fleet vehicle, AECOM may run a Motor Vehicle Driving Record report and provide this report to my Supervisor. _____ (Initial)</p> <p>I understand I must notify supervisor immediately of any change to the status of my Driver's License, any citation or violation I receive driving for company business, and any incident that occurs while driving for company business. _____ (Initial)</p> <p>I understand that AECOM reserves the right to terminate my driving privileges and associated benefits at any time, for any reason, in its sole discretion. _____ (Initial)</p> <p>I understand that I am required to participate in a defensive driving course at AECOM's expense and may be required to participate in more advance training. _____ (Initial)</p> <p>This procedure and my signed acknowledgement supplement the terms of my employment relationship with AECOM. _____ (Initial)</p>			
Date:		Signature:	
Supervisor			
I confirm that the Driver's License Number, Expiration Date and Proof of Insurance designated above are consistent with the employee's Driver's License and Proof on Insurance.			
Date:		Signature:	
Distribution			
<p>When the <i>Authorization</i> is completed email a copy to hrrecords@aecom.com (for inclusion in the employee's file). Additional copies must be provided to the following:</p> <ol style="list-style-type: none"> 1) The employee 2) The supervisor (if the employee is assigned to an office location) 3) Project record (if the employee is assigned to a project location) 			

Americas

Vehicle Inspection Checklist

S3NA-005-FM2

Vehicle Tag No :	Date:	Time:	Mileage:	Driver Name:	Location:		
<p>Inspection Checklist: This Pre-Trip Vehicle Inspection Checklist is intended to be completed by the vehicle driver prior to departing on a trip. Checking boxes means that item is present and functioning. Deficiencies increase risk of an incident and should be repaired or corrected prior to departure. This checklist should only be used in addition to an on-going vehicle maintenance program. For AECOM Fleet Vehicles, report deficiencies to: 800-477-2211 (Wheels)</p>							
Item					Yes	No	N/A
1. General							
1-1. Proof of insurance and registration available and current?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1-2. Is the date of the last regular maintenance known, or is the mileage/date of next scheduled maintenance known?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1-3. Have any safety recalls issued for this vehicle been addressed?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1-4. Is the overall condition of the vehicle good (no leaks , body damage, unusual sounds when started)?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Tires							
2-1. Do all four tires have sufficient tread for driving conditions? Legal limit: 2/32" (for rain/snow: > 4/32")					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2-2. Are tires sufficiently inflated for driving conditions?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2-3. Are the lug nuts and stem caps present and tight for each tire?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2-4. Is the spare tire and jack present and in good condition?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Driver's and Passenger's Seat							
3-1. Are the pedal pads in good condition?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-2. Are the floor mats in good condition and not interfering with the pedals?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-3. Is the seat properly adjusted (including the headrest)?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-4. Is the seatbelt in good condition?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-5. Are the mirrors in good condition (not broken, dirty)?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-6. Is the dashboard free of warning lights and do the gauges appear to work when the car is started?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-7. Does the horn work?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-8. Are distractions such as cell phones and gps units secured so they do not encourage?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Lights and Signals							
4 -1. Do the headlights and high beams work?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4-2. Do the turn signals work (front and rear)?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4-3. Do the brake lights work, including the high light in the rear window?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4-4. Do the hazard lights (emergency flashers) work?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4-5. Do backing lights work?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Windows and Windshield							
5-1. Is the windshield clean and unbroken?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-2. Are the wiper blades in good condition (front and rear)?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-3. Are all the windows clean and unbroken and windshield fluid available and operational?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Emergency Equipment (as needed per conditions/project requirements)							
6-1. Is there a "Safety Kit" (fire extinguisher, first aid, safety triangle and 2 reflective vests)?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6-2. Is there a first aid kit, has it been inspected recently?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6-3. Is a means for emergency communication available?					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Other Equipment (as needed per conditions/project requirements)			
7-1. Is there a means to secured loads (cargo next, container)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7-2. Are cones or other warning devices available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7-3. Is weather specific equipment (snow chains, tired etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Americas

Journey Management Plan

S3NA-005-TP1

Journey Management Plan – required for trips > 100 miles (one way)	
1. Driver and Passenger Information	
Driver Name:	
Driver Training Completed:	
Passengers:	
2. Vehicle Information	
Vehicle Type/Description:	
3. Trip Information	
What is the purpose of the trip?	
Single Trip: <input type="checkbox"/> Reoccurring Trip: <input type="checkbox"/> / / to / /	
Is traveling for this purpose necessary?	
Have alternate modes of travel (telepresence, public transportation, air,) been evaluated? <input type="checkbox"/> YES <input type="checkbox"/> NO	
Departure Location:	
Departure Date:	Time:
Arrival Location:	
Arrival Date:	Estimated Time:
What is the weather forecast:	
What is the route of travel: (okay to insert map)	
4. Special Conditions	
Check all that may apply:	
<input type="checkbox"/> Night Driving	<input type="checkbox"/> Rugged Terrain (4 x 4)
<input type="checkbox"/> Weather	<input type="checkbox"/> Large Vehicles/Farm Equipment
<input type="checkbox"/> Long Driving (Over 2 hours)	<input type="checkbox"/> Animals
<input type="checkbox"/> Fatigue	<input type="checkbox"/> Rush Hour/Heavy Traffic
<input type="checkbox"/> Potential for distraction	<input type="checkbox"/> Towing
<input type="checkbox"/> Other _____	<input type="checkbox"/> Other _____
<input type="checkbox"/> Other _____	<input type="checkbox"/> Other _____

5. Site Arrival/Departure Procedure	
1) Notify supervisor of safe arrival.	
6. Site Arrival/Departure Procedure	
1) Notify supervisor of safe arrival.	
7. Emergency Planning	
AECOM Supervisor (Name and Phone):	
AECOM Project Manager (Name and Phone):	
Roadside Service:	For AECOM Fleet Vehicles Use: 800-477-2211 (Wheels)
AECOM Incident Reporting Line: 800-348-5046	
AECOM Fleet Management: 800-477-2211	
8. Approvals: all JMPs shall be reviewed and acknowledged by the driver and the driver's supervisor. A copy of the form shall remain with the driver and the supervisor for the duration of the journey. (Electronic copies are acceptable).	
Driver's Signature:	
Project Manager or Supervisor Name and Signature:	

Electrical, General

1.0 Purpose and Scope

- 1.1 To minimize and control electrical hazards in the workplace.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.
- 1.3 As a general rule, AECOM employees shall not work on exposed, energized systems with a potential greater than 50 volts. This work should be performed by a qualified electrician.

2.0 Terms and Definitions

- 2.1 **Arc Flash** – A dangerous condition associated with the release of energy during an electrical arc.
- 2.2 **Arc Flash Analysis** – A mathematical determination of the energy released by an electric arc and the distance from the source that a flash hazard exists. The process for an Arc Flash Analysis is defined in National Fire Protection Act 70E of the National Electric Code.
- 2.3 **Circuit Protective Device** – A load-rated switch, circuit breaker, or other device specifically designed as a disconnecting means for opening, reversing, or closing of live circuits.
- 2.4 **Energized Electrical Equipment** – Electrically connected to or having a source of voltage.
- 2.5 **Flash Hazard** – A dangerous situation associated with the release of energy caused by an electric arc.
- 2.6 **Ground Fault Circuit Interrupter (GFCI)** – An electrical device that protects the users of all devices connected to it from electrical shock. The GFCI is part of the circuit or device in use and continuously measures the current in that circuit. If a leakage of current is detected, as in the case of an electrical short circuit, the circuit is opened at the GFCI and current cannot flow beyond the GFCI.
- 2.7 **Licensed Electrician** – A person who possesses the local licenses and certifications to work on electrical circuitry, panels or equipment in full compliance with local legislation.
- 2.8 **Portable Electric Equipment** – Cord- and plug-connected equipment and extension cords.
- 2.9 **Qualified Persons** – Individuals who have specific and documented training to avoid the hazards of working on or near energized electrical equipment and have been specifically permitted to near exposed energized and parts.
- 2.10 **Shock Hazard** – A dangerous situation associated with the possible release of energy caused by contact or approach to live parts.
- 2.11 **Unqualified Persons** – Individuals with little or no training to avoid the hazards of energized electrical parts or equipment.

3.0 References

- 3.1 [Learning Management System \(LMS\)](#)
- 3.2 S3NA-208-PR1 Personal Protective Equipment Program
- 3.3 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.4 S3NA-406-PR1 Electrical Lines, Overhead
- 3.5 S3NA-410-PR1 Hazardous Energy Control

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Manager

- Approve all Energized Electrical Work Permits.
- Provide technical guidance in support of this procedure

4.1.2 District SH&E Manager

- Provide technical guidance in support to the **Project Manager**.

4.1.3 Site Safety Supervisor or Site Safety Officer

- Assist the **Project Manager** in compliance with the requirements of this procedure.

4.1.4 Employees

- All AECOM **employees** engaged in project field activities shall follow the requirements of this procedure.
- AECOM **employees** will stop work if workers, other than Qualified Persons, are exposed to live electrical systems at unknown voltages or potentials greater than 50 volts
- No employee shall open electrical panels unless they are a Qualified Person.

4.2 Training

Employees who have potential exposures to electrical hazards shall be trained in and be familiar with the electrical safety-related work practices required by the applicable regulations. Refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning* for specific required training assigned in the LMS.

4.3 General Requirements

4.3.1 Electrical outlets utilized to supply power for electrical equipment during field operations shall be of the three-wire grounding type. They should be tested for correct polarity and adequacy of the ground with a circuit analyzer. If it is determined that the outlet is incorrectly wired or inadequately grounded, it must not be used until serviced by a licensed electrician.

4.3.2 GFCI devices will be in place between the equipment and power source for all temporary circuits unless protected by an assured equipment grounding program as defined in this procedure and *S3NA-302-WI2 Ground Fault Protection Safe Work Practices* (i.e., circuits that are not part of a permanently installed facility electrical system, such as on a construction site or temporary field installation).

4.4 Distribution System Setup

4.4.1 Under no circumstances shall electrical lines be routed through doorways, hatches, windows, or other openings.

4.4.2 Electric lines crossing work areas, personnel, or vehicular traffic areas shall be either fastened securely overhead (at a height that provides safe clearance for work operations), or protected by a cover capable of withstanding the imposed loads without creating a trip hazard.

4.4.3 Circuit breakers shall be labeled to indicate their use.

4.4.4 All circuit breaker panels shall be kept covered when not in use.

4.4.5 All live parts of electrical equipment operating at 50 volts or more shall be properly guarded against accidental contact.

4.4.6 Extension Cord Use

- Extension cords and electrical connections on handheld and other power tools will be inspected prior to use for cuts, kinks, frayed wires, etc. If any deficiency is noted, the

equipment will be tagged "OUT OF SERVICE" and removed from service. Manufacturer-installed insulated electrical cords will not be repaired except by a licensed electrician.

- Extension cords are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or create a tripping hazard.
- Extension cord sets for use in field operations should be of the three-wire grounding type and will be rated for the intended load.
- Use of extension cords is allowed only for temporary installations not to exceed 90 days.
- Extension cords shall be provided with a plug cap that is either molded to the cord or equipped with a cord clamp to prevent strain on the terminal screws.
- Extension cords shall not be fastened with staples or otherwise hung in a manner that could damage the outer jacket or insulation.
- Ground fault circuit interrupters shall be used for all nonpermanent wiring needed for construction purposes or when working outdoors, in wet or moist areas or elsewhere as required by legislation.

4.4.7 Temporary Lights/Task Lights

- A temporary light shall not be suspended by the cord unless the cord and light are designed for suspension.
- Temporary lights shall be equipped with bulb protectors unless they are installed at least 7 or more feet overhead.

4.5 Working on or Near Energized Parts

4.5.1 Working on Energized Circuits

Working on or near energized parts covers either potential direct physical contact or contact by means of tools or equipment and working close enough to the energized part to draw an arc.

Any work on exposed, live electrical systems above 50 volts shall be done by a licensed electrician.

- Prior to performing any work near exposed, energized systems, the **Qualified Person** shall:
 - Confirm with the Licensed Electrician that it is safe to do so.
 - Perform a Shock Hazard Analysis.
 - Perform an Arc Flash Analysis.
 - Establish emergency contacts.
 - Complete and have approved the Energized Electrical Work Permit.
 - Have all required personal protective equipment (PPE), insulated tools, and test equipment tested and ready to use.
 - Know and understand the procedures to be followed.
 - Ensure that adequate lighting and clearance space is available.
 - Remove all conductive clothing and jewelry.

4.5.2 Working Near Overhead Power Lines

- Personnel working in the vicinity of overhead power lines, either on the ground or elevated, shall comply with *S3NA-406-PR1 Electrical Lines, Overhead*.
- All workers and equipment including cranes and drill rigs shall maintain a clearance distance of at least 50 feet from overhead power lines unless a detailed assessment demonstrating that a smaller clearance distance provides protection has been completed.

4.6 Grounding

- 4.6.1 The path to ground from circuits, equipment, and enclosures will be permanent and continuous.
- 4.6.2 Electrical installations at project sites will be protected by either an equipment grounding conductor program or GFCIs. The two options are:
- All 120-volt, single-phase, 15- and 20-amp receptacles that are not part of permanent wiring will be protected by GFCIs.
 - The equipment grounding conductor program will cover extension cords, receptacles, and cord- and plug-connected equipment. The program will include the following elements:
 - A written description of the program.
 - A competent person to implement the program.
 - Daily visual inspections of extension cords and cord- and plug-connected equipment for defects. Equipment found damaged or defective shall be removed from use and not used until repaired.
 - Continuity tests of the equipment grounding conductors or receptacles, extension cords, and cord- and plug-connected equipment every three months.
 - Compliance with the applicable legislative requirements for grounding of systems, circuits, and equipment.
- 4.6.3 If the equipment grounding conductor program option is chosen, the designated competent person at the site shall maintain inspection records.

4.7 PPE/Work Practices

- 4.7.1 PPE requirements shall be determined based on the results of each of the following: Task Hazard Analysis, Shock Hazard Analysis, and Arc Flash Analysis. Refer to the *S3NA-208-PR1 Personal Protective Equipment Program*.
- 4.7.2 Nonconductive hardhats shall be worn when there is danger of head injury from electric shock or burns due to exposure to energized parts.
- 4.7.3 Jewelry shall not be worn when working around or with energized parts.
- 4.7.4 Insulated tools shall be used to work with energized parts. Tools that have insulation that might be damaged (e.g., rubber handles) shall be inspected prior to each use to confirm the insulation is not damaged.
- 4.7.5 **Eye protection with side shields shall be worn when working with energized parts.**
- 4.7.6 Rubber mats, non-conductive shields, or protective barriers shall be used as needed to protect employees from electrical hazards.
- 4.7.7 Appropriate insulating gloves shall be worn to pick up or unplug connections that are in highly conductive areas, such as in water.
- 4.7.8 Do not plug in or unplug electric equipment with wet hands.

4.8 Portable Electrical Equipment

- 4.8.1 Double-insulated, portable, industrial-type electrical tools meeting the requirements of the National Electrical Code (NEC) (United States) / Canadian Electrical Code (CE Code) are authorized for use (ground wire not required). Where this type of tool is used, the equipment will be distinctly marked.
- 4.8.2 Portable electrical tools not provided with special insulating or grounding protection are not for use in damp, wet, or conductive locations (e.g., by persons standing on the ground or on metal floors).
- 4.8.3 All portable electrical appliances and equipment with non-current-carrying metal parts to which personnel may be exposed shall be grounded by a continuous conductor of adequate capacity from

the device to a grounded receptacle. The **Site Safety Officer** shall resolve any question of whether or not a particular appliance should be grounded.

- 4.8.4 Manufacturer-installed guards shall not be tampered with, modified, or removed. These guards will be in place and utilized during operation of equipment.
- 4.8.5 Portable electrical equipment shall be handled in a manner that will not cause physical damage to the equipment.
- 4.8.6 Portable electrical equipment shall not be carried by the cord, nor raised or lowered by the cord.
- 4.8.7 Electrical cords shall not be removed from a receptacle by pulling on the cord line.
- 4.8.8 **Employees'** hands shall not be wet when plugging and unplugging cord and plug connected equipment and extension cords.
- 4.8.9 Portable electric equipment shall be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.
- 4.8.10 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.).
- 4.8.11 Portable electric equipment and extension cords used in areas exposed to gases, fumes, vapors, liquids, or other agents having a deteriorating effect shall be approved for use in those locations.
- 4.8.12 Portable electric equipment and extension cords used in areas in which hazardous concentrations of flammable gases or vapors exist shall be approved for use in those locations.
- 4.8.13 After a circuit is de-energized by a circuit protective device, the circuit may not be manually reenergized until it has been determined that the equipment and circuit can be safely energized.
- 4.8.14 The outlet box for portable extension cords for outdoor use shall be weatherproof and shall be maintained in good condition.

5.0 Records

- 5.1 The Shock Hazard Analysis and the Arc Flash Analysis forms shall be retained in the project file.
- 5.2 The completed *S3NA-302-FM1 Energized Electrical Work Permit* shall be retained in the project file.

6.0 Attachments

- 6.1 S3NA-302-WI1 Electrical Safe Work Practices
- 6.2 S3NA-302-WI2 Ground Fault Protection Safe Work Practices
- 6.3 S3NA-302-WI3 Generator Safety Card
- 6.4 S3NA-302-FM1 Energized Electrical Work Permit
- 6.5 S3NA-302-ST Electrical Regulations

Electrical Safe Work Practices

1.0 Purpose

- 1.1 The purpose of this work instruction is to confirm that all live electrical work conducted under the control of AECOM personnel is carried out in accordance with legislation and recognized best practices in order to provide adequate protection to workers from potential arc flash and/or electrical shock.

2.0 Definitions

- 2.1 **Arc Rating** – The maximum incident energy resistance demonstrated by a material prior to breakdown or at the onset of a second-degree skin burn (expressed in cal/cm²).
- 2.2 **Flash Hazard** – A dangerous situation associated with the release of energy caused by an electric arc.
- 2.3 **Energized Electrical Equipment** – Electrically connected to or having a source of voltage.
- 2.4 **Shock Hazard** – A dangerous situation associated with the possible release of energy caused by contact or approach to live parts.

3.0 Responsibilities

3.1 Project Manager

- 3.1.1 Be familiar with all precautions and Federal and State/Provincial regulations and Best Practices.
- 3.1.2 Provide training on this Work Instruction to authorized employees covering:
- Nature and control of known shock and arc flash hazards.
 - Means of eliminating and controlling shock and arc flash hazards.
 - Special electrical personal protective equipment (PPE) requirements (task specific).
 - Procedure for reporting any deviations to this Work Instruction.
- 3.1.3 Control access to energized electrical equipment with potential of shock or arc flash to authorized personnel only.
- 3.1.4 Confirm availability of proper tools for the operation and maintenance of electrical equipment.
- 3.1.5 Proper identification and guarding of potentially hazardous electrical equipment.
- 3.1.6 Providing available electrical one-line diagrams.
- 3.1.7 Confirm proper housekeeping around energized electrical equipment at all times.
- 3.1.8 Provide proper working conditions, including adequate lighting, to facilitate work in a safe environment.
- 3.1.9 Provide proper supervision of employees.
- 3.1.10 Maintaining a list of authorized electrical supervisor, authorized electrical worker, and attendant.
- 3.1.11 Implementation an ongoing evaluation of this Best Management Practice.
- 3.1.12 Terminate the work and cancel the permit when live work has been completed or any new electrical hazard arises.
- 3.1.13 Verify that communication modes are available and have been tested.
- 3.1.14 Remove unauthorized individuals who enter or who attempt to enter the approach boundaries during live work.

- 3.1.15 Confirm that live work remains consistent with terms of the live work permit and that acceptable working conditions are maintained.
- 3.1.16 Withdraw the live work permit and stop all work if unsafe conditions are reported during any live work (e.g. sparking, smoldering etc.). Do not permit work on that equipment until the cause of any unsafe condition is thoroughly investigated and the live work procedure has been reviewed to prevent reoccurrence.

3.2 **Authorized Electrical Attendant**

- 3.2.1 Practice all precautions and Federal and State/Provincial regulations and Best Practices.
- 3.2.2 Understand the hazards that may be faced during live work, including the potential for arc flash, shock hazard, and other related hazards.
- 3.2.3 Be aware of the potential of arc flash or shock possible to the **authorized worker**.
- 3.2.4 Maintain an accurate count of authorized workers working near the live equipment or inside approach boundaries.
- 3.2.5 Remain near the approach boundary until relieved by another authorized electrical attendant.
- 3.2.6 Communicate with authorized workers as necessary to confirm maintenance of safe conditions at all times.
- 3.2.7 Monitor activities inside and outside the approach zone to determine if it is safe for the worker to continue to remain in the approach zone. Order the **authorized worker** to stop live work under any of the following conditions:
 - The attendant detects a problem;
 - The attendant detects the signs of short-circuiting, such as electrical sparking, smoldering, or any other abnormality;
 - The attendant detects a situation outside the approach zone that could endanger the worker; and
 - If the attendant cannot effectively and safely perform all assigned duties.
- 3.2.8 Perform no other duties that might interfere with the attendant's primary duty to monitor and protect the authorized worker.

3.3 **Authorized Electrical Worker**

- 3.3.1 Perform all work in accordance with Federal and State/Provincial regulations, AECOM policies and procedures, and this work instruction.
- 3.3.2 Be continuously alert, focused, and aware of the hazards of performing the task.
- 3.3.3 Understand AECOM Safety, Health and Environmental policies and standards as well as site-specific electrical safe work practices.
- 3.3.4 Examine and understand all the documents provided by AECOM and manufacturers, including all specific hazards, advisories, cautions, etc.
- 3.3.5 Be knowledgeable of the use and selection of the proper tools to safely perform the electrical task safely.
- 3.3.6 Complete a Safe Work Plan prior to the start of a task and during work, if conditions change.
- 3.3.7 Maintain good housekeeping around work areas. Remove all debris, materials, etc., at the completion of tasks.
- 3.3.8 Report any hazardous (uncontrolled) conditions to AECOM's authorized supervisor.
- 3.3.9 Understand the hazards that may be faced during live work, including arc flash, shock, or other electrical hazards.

- 3.3.10 Properly use required PPE and electrical tools as specified in this work instruction and the applicable Safe Work Plan.
- 3.3.11 Communicate with the authorized electrical attendant as necessary.
- 3.3.12 Alert the attendant whenever any abnormality occurs (e.g., sparking, minor shock, burning smell, etc.) or symptoms of unsafe conditions are observed.
- 3.3.13 Stop all work and exit from the approach zone whenever:
 - An order to evacuate is given by the authorized electrical attendant or the authorized supervisor; or
 - When the worker observes any warning sign or symptom of short circuiting or a dangerous situation; or
 - When the **supervisor** gives an order to stop work.

4.0 Multi-employer Live Electrical Work Coordination

4.1 AECOM will:

- Inform the contractor that the workplace contains shock and/or arc flash potential and that live work is allowed only through compliance with a live work permit program meeting the requirements of the applicable Federal and State/Provincial legislation.
- Appraise the contractor of the elements of the work, including the hazards identified and all past experiences with the live work that make the live work hazardous.
- Appraise the contractor of any precautions or procedures that have been implemented for the protection of employees in the approach zone where contractor personnel will be working.
- Coordinate live work operations with the contractor when both AECOM employees and contractor employees will be working in or near approach zone, so that employees of AECOM and the contractor do not endanger each other.
- Debrief the contractor at the conclusion of the live work operations.

4.2 **Contractor Requirements** – In addition to complying with the live work permit requirements, each contractor who is retained to perform live electrical work will:

- Obtain any available information regarding live work from the **Project Manager**.
- Coordinate live work operations with the **Project Manager** when both AECOM personnel and contractor personnel will be jointly working in or near the approach zone.
- Practice work in accordance with Federal and State/Provincial regulations and industry best practices.
- Inform AECOM's **Project Manager** of the live work permit that the contractor will be using and of any hazards confronted or created during live work, either through debriefing or during live work.

5.0 Required Minimum Qualifications

- 5.1 All electrical work including instrumentation, installations, maintenance, troubleshooting, calibration, and operation of breakers will only be conducted by qualified, trained, and skilled personnel (this includes AECOM personnel and contractors/subcontractors). These personnel will meet all qualification requirements mandated by the Federal/State/Provincial regulations as well as applicable electrical associations and trade bodies.
- 5.2 The Project Manager, in consultation with the Safety, Health and Environment (SH&E) Department, will determine the minimum qualifications requirements for any work with the potential for arc flash.

6.0 Working on or Near Electrical Conductors of Circuit Parts

- 6.1 Safe work practices shall be used to safeguard employees from injury when working on or near exposed electric conductors or circuit parts that can be energized.
- Live Parts – Safe Work Conditions: Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them.
 - Live Parts – Unsafe Work Conditions: Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into electrically safe conditions.
- 6.2 Working on or near exposed electrical conductors OR circuit parts that are, or might become, energized – Prior to working on or near exposed electrical conductors and circuit parts operating at 50 volts or more, lockout/tagout devices shall be applied in accordance with AECOM and site-specific policies.
- 6.3 Electrical Hazard Analysis – If the live parts operating at 50 volts or more are not placed in electrically safe condition, other safety-related work practices shall be used to protect employees who might be exposed to electrical hazards. Safe work practices mentioned below shall be established before any person approaches exposed live parts within limited approach boundary:
- 6.3.1 Shock Hazard Analysis – A shock hazard analysis shall determine the voltage to which personnel will be exposed, boundary requirements, and the PPE necessary in order to minimize the possibility of electrical shock.
- 6.3.2 Flash Hazard Analysis – A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the flash protection boundary and the PPE that people within the flash protection boundary shall use.

7.0 Shock Hazard Analysis and Approach Boundaries

- 7.1 A comprehensive Shock Hazard Analysis Survey is the method used to:
- 7.1.1 Systematically analyze shock hazards,
 - 7.1.2 Identify approach boundaries, and
 - 7.1.3 Identify appropriate PPE.
- 7.2 Before permitting live work on electrical equipment, each project site having electrical equipment operating at more than 50 volts is required to conduct a Shock Hazard Analysis Survey. Upon completion of the survey, the applicable electrical areas/spaces will be labeled in accordance with survey results.
- 7.3 Shock hazard analysis for individual equipment is not required if a facility-wide shock hazard analysis has been conducted and if conditions (including labels and signage) are maintained at all times.
- NOTE: Only authorized personnel are allowed to work within the approach boundaries.*
- 7.4 No qualified person shall approach or take any conductive object closer to exposed live parts operating at 50 volts or more than the restricted approach boundary set forth in Appendix A-1 [Table 130.2 (C) of the National Fire Protection Act (NFPA) 70-E].
- 7.5 In the absence of a facility-wide survey, a Shock Hazard Analysis (including the identification of approach boundaries) shall be conducted (see Appendix A-1 of this Practice) for all electrical equipment operating at over 50 volts.
- 7.6 Results of both facility-wide as well as individual Shock Hazard Analysis Survey shall be made available to all authorized employees. Additionally, any recommendations given by the survey generated from the survey shall be reviewed by the Project Manager and shall be addressed in a timely manner.

8.0 Arc Flash Hazard Analysis and Approach Boundaries

- 8.1 Arc flash safety requirements apply to all electrical equipment operating at 50 volts or more.

- 8.2 A comprehensive Arc Flash Hazard Analysis Survey is the method used to:
- 8.2.1 Systematically analyze the potential for arc flash,
 - 8.2.2 Identify the limits of the approach, and
 - 8.2.3 Identify appropriate PPE.
- 8.3 Once a comprehensive facility Arc Flash Survey has been conducted and electrical work areas/spaces are labeled in accordance with survey results, an individual Arc Flash Hazard Analysis is not required, provided that qualified personnel confirm that the conditions, as indicated on the labels and signs, are maintained.
- NOTE: Only authorized personnel are allowed to work within the limits of approach.*
- 8.4 Please refer to Appendix A-1 for details.
- 8.5 Prior to performing any work on energized electrical systems, an Arc Flash Hazard Analysis (including the identification of approach boundaries) will be conducted in accordance Appendix F of this practice (taken from NFPA 70E Section 130.3).

9.0 Required PPE Categorized by Exposure

The following specialized PPE requirements will be used while working on energized electrical systems:

- 9.1 PPE as prescribed by the shock hazard analysis and arc flash analysis; or
- 9.2 PPE requirements identified in Appendix A-2 of this practice (taken from NFPA 70E Sections 130.2 and 130.7).

10.0 Required Tools and Equipment

Only tools and testing or protective equipment approved by ANSI/ASTM/CSA for the relevant voltage rating [see Table 130.7(C)(8) or Canadian Standards Association for appropriate voltage rating] will be used when working on energized electrical systems. All tools and testing or protective equipment will be visually inspected prior to use to confirm that the protection systems associated with the tool or equipment are not damaged or impaired and that diagnostic meters and tools are configured properly. Any tool or testing or protective equipment suspected of being compromised will be immediately taken out of service and will be tagged for disposal.

11.0 Work on Energized Electrical Systems

- 11.1 All electrical maintenance or troubleshooting will be done on de-energized circuits, to the extent practical. Work on energized circuits can only be done under special circumstances using a "Live Work Permit" issued by authorized electrical supervisor. This permit takes into consideration the voltage levels, known electrical hazards, communication requirements, and need for watch persons, etc. The following procedure will be observed for a live work permit:
- 11.1.1 The person requesting the work (authorized worker) will complete the permit and will retain the original with him or her during the work. Copy of the permit will be displayed at a prominent location in the control room as a notice that live work has been authorized in certain part of the plant/project.
 - 11.1.2 Permit will be reviewed for correctness, proper safety precautions, and adequacy of controls by the authorized electrical supervisor. After satisfying all safety requirements, an authorized electrical supervisor will sign the permit and will give the original copy to the authorized electrical worker.
 - 11.1.3 Upon work completion, the authorized worker will note any observation on the permit and will return the original to the authorized supervisor.
 - 11.1.4 Authorized supervisor will keep both copies of the permit as a controlled record for a period of 12 months.

- 11.2 The following conditions will be met for live electrical work:
 - 11.2.1 If any equipment or instrumentation is to be disabled while other related components or systems are still functioning, the Live Work Permit should record how process safety of the remaining systems will be maintained.
 - 11.2.2 All electrical and instrumentation work conducted will be recorded in the applicable MCC log. The documentation will include a reference to the permit number where appropriate.
 - 11.2.3 The worker will inform the operations supervisor that he or she intends to de-energize a circuit. He or she will also inform the operations supervisor when the work is complete and that the system can be returned to service.
- 11.3 See *S3NA-302-FM1 Energized Electrical Work Permit* for a suggested template for a “Live Work Permit.”

12.0 Lockout/Tagout Policy and Procedures

- 12.1 All equipment will be locked out prior to any work commencing in accordance with AECOM’s procedure *S3NA-410-PR1 Hazardous Energy Control* and applicable site-specific lockout/tagout program.

13.0 Troubleshooting Procedure

- 13.1 The troubleshooting of electrical equipment often requires working with live circuits. Where possible, work will be done on de-energized circuits following the relevant AECOM and site-specific lockout/tagout policy. However, troubleshooting may require limited work on live circuits; if such work is required it will be done using the “Live Work Permit” and site-specific Troubleshooting Guidelines.

14.0 Housekeeping

- 14.1 All areas containing electrical equipment will:
 - 14.1.1 Be maintained and kept clean.
 - 14.1.2 Be well illuminated.
 - 14.1.3 Not be used for storage of supplies.
 - 14.1.4 Not be used for the storage of any flammable materials.
 - 14.1.5 Be assessed for safety hazards.
 - 14.1.6 Be suitably ventilated to control dust, temperature, and humidity.

15.0 Communication

- 15.1 Personnel working in or around equipment with electrical hazards will employ a suitable means of communication to confirm their safety.
- 15.2 The means of communication may include:
 - 15.2.1 Authorized attendant (required for ALL live work conducted on 600 volts and above).
 - 15.2.2 Permits.
 - 15.2.3 Two-way radios.

16.0 Signage and Labels

- 16.1 MCCs, ECRs, battery rooms, and electrical panels are required to have the following labeling to identify arc flash and shock hazards. The information on the label will include:
 - 16.1.1 Flash Hazard Boundary (Arc Flash Current);
 - 16.1.2 Flash Hazard at 18 inches in cal/cm² or joules;

- 16.1.3 Hazard Risk Categories (PPE requirements);
 - 16.1.4 Shock Hazards;
 - 16.1.5 Limited Approach Boundaries;
 - 16.1.6 Restricted Approach;
 - 16.1.7 Prohibited Approach; and
 - 16.1.8 Log book to record all electrically related activities.
- 16.2 All doorways to buildings and enclosures containing energized electrical equipment will be signed to indicate that:
- 16.2.1 Access is restricted to authorized personnel only; and
 - 16.2.2 Electrical hazards exist beyond this (boundary, door, etc.).

17.0 Management of Change

- 17.1 Any changes to electrical and/or project instrumentation will be approved by the project manager prior to implementation.

APPENDIX A-1

Table 130.2(C) Approach Boundaries to Live Parts for Shock Protection
(All dimensions are distance from live part to employee.)

Nominal Voltage Range (Phase to Phase)	Limited Approach Boundary	Exposed Fixed Circuit Parts	Restricted Approach Boundary; includes inadvertent movement adder	Prohibited Approach Boundary
	Exposed Moveable Conductor			
Up to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
50-300	10 feet	3.5 feet	Avoid Contact	Avoid Contact
300-750	10 feet	3.5 feet	1 feet	1 inch
More than 750 volts	Consult NACO's Master Electrician or other authorized electrician.			

APPENDIX A-2

Table 130.7(C)(10) Protective Clothing and Personal Protective Equipment (PPE) Matrix

Table 130.7(C)(11) Protective Clothing Characteristics

Hazard/Risk Category	Clothing Description (Typical number of clothing layers is given in parentheses)	Required Minimum Arc Rating of PPE [(J/cm ² (cal/cm ²))]
0	Non-melting, flammable materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials) with a fabric weight at least 4.5 oz/yd ² (1)	N/A
1	FR shirt and FR pants or FR coverall (1)	16.74 (4)
2	Cotton underwear – conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2)	33.47 (8)
3	Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3)	104.6 (25)
4	Cotton underwear plus FR shirt and FR pants plus multilayer flash suit (3 or more)	167.36 (40)
<p>NOTE:</p> <p>Arc rating: Arc rating is defined in Article 100 and can be either ATPV or E_{BT}.</p> <p>ATPV: ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve.</p> <p>E_{BT}: E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.</p>		

APPENDIX B

Protective Clothing and Equipment	Protective Systems for Hazard/Risk Category					
Hazard/Risk Category Number	-1 (Note 3)	0	1	2	3	4
Non-melting (according to ASTM F 1506-00) or Untreated Natural Fiber						
a. T-shirt (short-sleeve)	X			X	X	X
b. Shirt (long-sleeve)		X				
c. Pants (long)	X	X	X (Note 4)	X (Note 6)	X	X
FR Clothing (Note 1)						
a. Long-sleeve shirt			X	X	X (Note 9)	X
b. Pants			X (Note 4)	X (Note 6)	X (Note 9)	X
c. Coverall			(Note 5)	(Note 7)	X (Note 9)	(Note 5)
d. Jacket, parka, or rainwear			AN	AN	AN	AN
FR Protective Equipment						
a. Flash suit jacket (multilayer)						X
b. Flash suit pants (multilayer)						X
c. Head protection						
1. Hard hat			X	X	X	X
2. FR hard hat liner					AR	AR
d. Eye protection		—	—	—	—	—
1. Safety glasses	X	X	X	AL	AL	AL
2. Safety goggles				AL	AL	AL
e. Face and head area protection		—	—	—	—	—
1. Arc-rated face shield, or flash suit hood				X (Note 8)		
2. Flash suit hood					X	X
3. Hearing protection (ear canal inserts)				X (Note 8)	X	X
f. Hand protection			—	—	—	—
Leather gloves (Note 2)			AN	X	X	X
g. Foot protection						
Leather work shoes			AN	X	X	X
AN = As needed AL = Select one in group AR = As required X = Minimum required						
NOTES:						
1. See Table 2. Arc rating for a garment is expressed in cal/cm ² .						
2. If voltage-rated gloves are required, the leather protectors worn external to the rubber gloves satisfy this requirement.						
3. Hazard/Risk Category Number “-1” is only defined if determined by Notes 3 or 6 of Table 130.7(C)(9)(a).						
4. Regular weight (minimum 12 oz/yd ² fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants. The FR pants used for Hazard/Risk Category 1 shall have a minimum arc rating of 4.						
5. Alternate is to use FR coveralls (minimum arc rating of 4) instead of FR shirt and FR pants.						
6. If the FR pants have a minimum arc rating of 8, long pants of non-melting or untreated natural fiber are not required beneath the FR pants.						
7. Alternate is to use FR coveralls (minimum arc rating of 4) over non-melting or untreated natural fiber pants and T-shirt.						
8. A face shield with a minimum arc rating of 8, with wrap-around guarding to protect not only the face, but also the forehead, ears, and neck (or, alternately, a flash suit hood), is required.						
9. Alternate is to use two sets of FR coveralls (the inner with a minimum arc rating of 4 and outer coverall with a minimum arc rating of 5) over non-melting or untreated natural fiber clothing, instead of FR coveralls over FR shirt and FR pants over non-melting or untreated natural fiber clothing.						

Table 2: Protective Clothing Characteristics

Hazard/Risk Category	Clothing Description (Typical number of clothing layers is given in parentheses)	Required Minimum Arc Rating of PPE [(J/cm ² (cal/cm ²)]
0	Non-melting, flammable materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials) with a fabric weight at least 4.5 oz/yd ² (1)	N/A
1	FR shirt and FR pants or FR coverall (1)	16.74 (4)
2	Cotton underwear – conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2)	33.47 (8)
3	Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3)	104.6 (25)
4	Cotton underwear plus FR shirt and FR pants plus multilayer flash suit (3 or more)	167.36 (40)
<p>NOTE:</p> <p>Arc rating is defined in Article 100 and can be either ATPV or E_{BT}. ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve. E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.</p>		

APPENDIX C

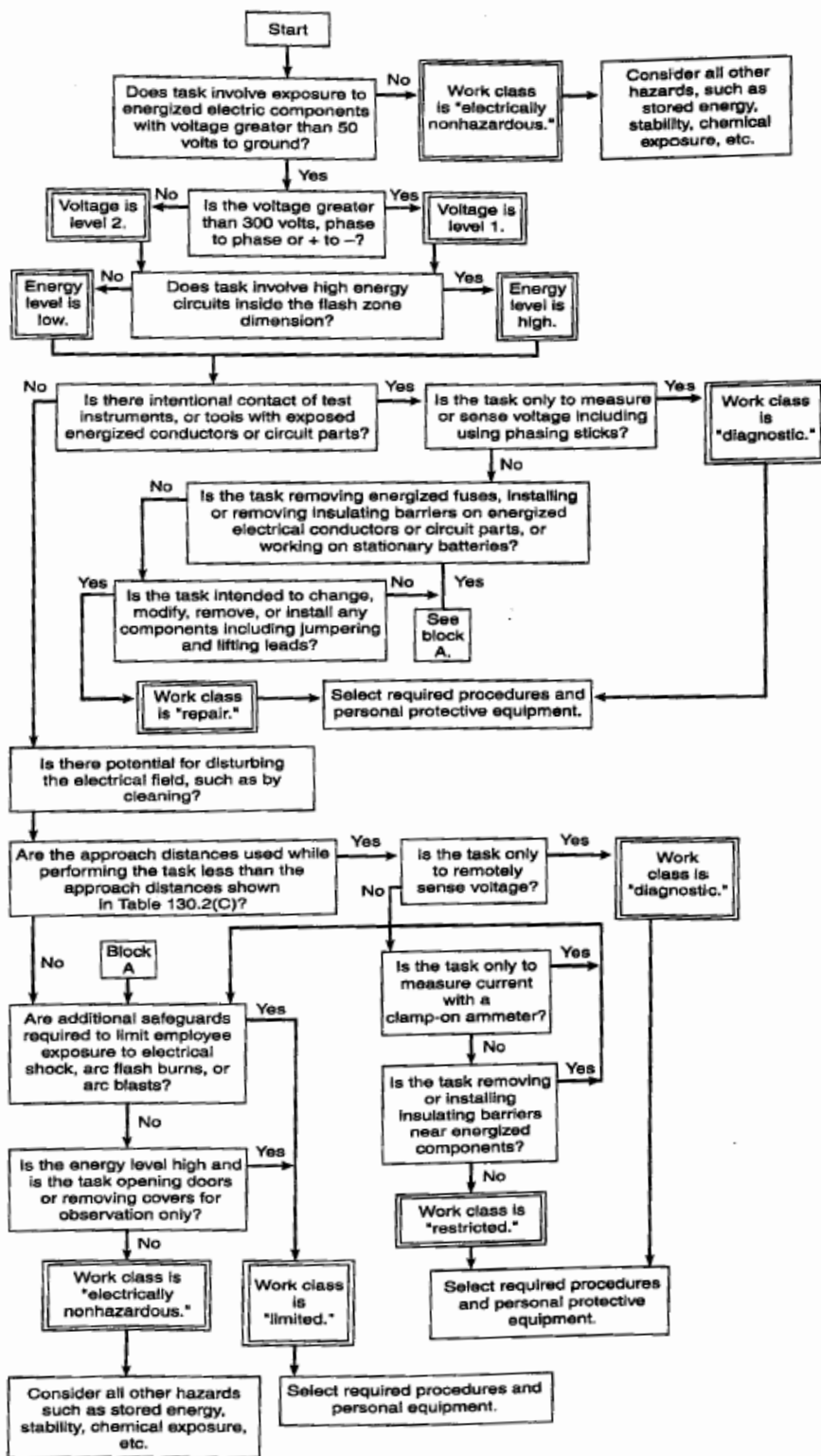


Figure F.1 Hazard/Risk Analysis Evaluation Procedure Flow Chart.

APPENDIX E**Flash Protection Boundary**

For system that are above 600 volts or less, the Flash Protection Boundary shall be 4.0 feet, based on the product of clearing time of 6 cycles (0.1 second) and the available bolted fault current of 50 kA, or any combination not exceeding 300 kA cycles (5,000 ampere seconds).

For clearing times and bolted fault currents other than 300 kA cycles, or under engineering supervision, the Flash Protection Boundary shall alternatively permitted to be calculated in accordance with the following general formula:

$$D_c = [2.65 \times MVA_{bf} \times t]^{1/2}$$

or

$$D_c = [53 \times MVA \times t]^{1/2}$$

where:

D_c = distance in feet from an arc source for a second-degree burn

MVA_{bf} = bolted fault capacity available at point involved (in mega volt-amperes)

MVA = capacity rating of transformer (mega volt-amp). For transformer with an MVA rating below 0.75 MVA, multiply the transformer MVA rating by 1.25

t = time of arc exposure (in seconds)

At voltage levels above 600 volts, the Flash Protection Boundary is the distance at which the incident energy equals 5 J/cm² (1.2 cal/cm²). For situations in which fault-clearing time is 0.1 second (or faster), the Flash Protection Boundary is the distance at which the incident energy equals 6.24 J/cm² (1.5 cal/cm²).

Ground Fault Protection Safe Work Practices

1.0 Background

- 1.1 “Ground fault protection” is required on construction sites. To provide this protection, either “ground fault circuit interrupters” (GFCI) are to be used with temporary receptacles, or if allowed by legislation an “assured equipment grounding conductor program” is to be established in which plug-connected electrical equipment, extension cords, and temporary receptacles are tested on a periodic basis.

2.0 Ground Fault Circuit Interrupters

- 2.1 A GFCI is an electrical device that is designed to prevent electrocution from electrical leakage. It is designed to measure the difference in amperage between the “hot” wire and the “neutral” wire in a circuit. Under ideal conditions, the amperage should be the same in both wires. If there is electrical leakage (a ground-fault), the amperages will be different. If the difference is more than a predetermined amount, the GFCI “trips” and stops the flow of electricity.
- 2.2 GFCIs may trip from many causes:
- 2.2.1 Electrical leakage in the tool from internal defects, damaged insulation or from normal leakage in long runs of cords.
 - 2.2.2 Moisture in the air or cords lying in water or on moist dirt.
 - 2.2.3 Too many tools on one GFCI circuit.
 - 2.2.4 Faulty wiring of the GFCI into the circuit.
 - 2.2.5 Defective GFCI.
 - 2.2.6 Any such tripping will require the problem to be corrected before the protected circuit can be re-set.
- 2.3 All 120-volt, single-phase, 15- and 20-ampere temporary receptacles shall be protected with “approved” GFCIs. “Approved” means listed by Underwriters Laboratories.
- 2.4 There are several types of GFCIs.
- 2.4.1 A combination circuit breaker and GFCI that is installed in place of the ordinary circuit breaker.
 - 2.4.2 A receptacle containing a built-in GFCI.
 - 2.4.3 A portable GFCI that plugs into a receptacle and allows the extension cord or tool to be plugged into the GFCI.
 - 2.4.4 A portable unit containing several GFCI protected receptacles.
- 2.5 GFCIs contain a test button and a reset button. Each GFCI needs to be tested prior to use and on a periodic basis depending upon the manufacturer's recommendations (at a minimum monthly).

3.0 Assured Equipment Grounding Conductor Program

- 3.1 If allowed by local legislation, assured equipment grounding conductor program is to be used instead of GFCIs to provide ground fault protection, the program shall be governed by the following requirements.
- 3.1.1 Temporary receptacles shall be electrically grounded in accordance with the temporary wiring requirements of the National Electrical Code (United States)/Canadian Electrical Code.
 - 3.1.2 Extension cords shall be three-wire cords containing an equipment grounding conductor (ground wire).
 - 3.1.3 Electrical equipment that is plugged into a receptacle or extension cord (portable electrical tools, bench grinders, electric heaters, etc.) shall have a ground wire properly attached to the non-current-carrying metal

parts of the equipment. (Double-insulated tools have no ground wire and are therefore exempt from these testing and recording requirements but still need to be inspected for defects.)

- 3.1.4 The Worksite Manager and/or Supervisor are required to designate one or more competent persons to administer this testing and recording program.
- 3.1.5 Periodic testing of all plug-connected equipment, all extension cords, and all temporary receptacles is to be conducted at the following times:
 - Before a new item (equipment, cord, or receptacle) is put into use.
 - After any repairs to the item.
 - After any incident in which the item may have been damaged.
 - Within three months of the last test. (An exception is allowed in the Standard in which extension cords, and temporary receptacles, which are fixed in place and are not exposed to damage, may be tested every months months.)
- 3.1.6 The purpose of the test is to determine the following:
 - Temporary receptacles—to be sure that the receptacle is grounded.
 - Extension Cords—to be sure that the ground wire is connected to the proper terminal at each end and that the ground wire is continuous throughout the length of the cord.
 - Plug Connected Equipment—to be sure that the ground wire is connected to the proper terminal and to the non-current carrying metal parts of the equipment and that the ground wire is continuous from the equipment to the plug.
- 3.1.7 The tests may be conducted using the following instruments:
 - A receptacle tester may be used to test receptacles and to test extension cords when plugged into a receptacle.
 - A continuity tester, or a volt-ohm meter, may be used to test equipment and to test extension cords when not plugged into a receptacle.
- 3.1.8 Records must be kept to show which items have passed the test and when the test was conducted. These records may be either written inspection logs, a color-coding system using colored tape attached to the item, or some other effective means.
- 3.1.9 Color coding shall be used in the following manner:
 - After a plug-connected piece of equipment or an extension cord has passed the test, colored tape is to be placed around the cord near the plug. After a temporary receptacle has passed the test, colored tape is to be placed on the cover plate.
 - Any set of colors may be used, with the exception of white, black, or silver.
 - If there has been no overall site requirements established by the general contractor, use the following colors for the test periods.

January, February, March	Red
April, May, June	Blue
July, August, September	Orange
October, November, December	Green

- 3.1.10 The tests administered every three months are to begin on the first working day of each quarter. Testing and color coding are to be continued until all items covered by this program have been tested. The test administered every six months, for those receptacles and extension cords needing only semi-annual testing, are to be color coded using the quarterly color current at the time of the semi-annual test.

- 3.1.11 A visual inspection of plug-connected equipment, extension cords, and temporary receptacles is to be made by the user before each use. The purpose of the visual inspection is to look for damage or defects that could affect the safe use of the item. (Exception: extension cords and temporary receptacles that are fixed in place and not exposed to damage are not required to be given a daily visual inspection, but it is a good idea to do the daily visual inspection anyway.)
- 3.1.12 Equipment, cords, or receptacles showing damage or defects that could affect its safe operation are not to be used. This applies not only to the visual inspection before each use but also applies to any evidence of damage observed any time during use. Damaged items are to be taken out of service and are not to be used until properly repaired and retested.
- 3.1.13 Equipment covered by this program is not to be used until the equipment has been tested and color coded according to the requirements of this program.
- 3.1.14 A copy of this program is to be kept at the worksite.

Generator Safety Card

1.0 Objective/Overview

- 1.1 Portable generators should be used with extreme caution in order to prevent personal injury. When using a portable generator it is important to follow the manufacturer's instructions to avoid injuring someone or damaging your generator or appliances. Allow only trained, authorized personnel to operate the generator. Along with training, consider the need for other safety measures, including proper maintenance of equipment and personal protective equipment (PPE). It is important to note that muscle strains are the most common injury associated with portable generators.

2.0 Safe Operating Guidelines:

- 2.1 Follow manufacturer's recommended operating instructions; every generator is not the same.
- 2.2 Maintain adequate ventilation. Generators emit carbon monoxide (CO). Never operate a generator in an enclosed building without proper ventilation.
- 2.3 Turn the generator off to refuel. Gasoline and its vapors may ignite if they come into contact with hot components or an electrical spark, so store fuel in a properly designed container in a secure location.
- 2.4 To avoid a shock, make sure that your hands are dry and that you are standing in a dry place whenever you operate the generator.
- 2.5 Turn off equipment and lights supplied by the generator until it is running.
- 2.6 Use the right extension cord. Use only UL-listed, three-prong extension cords. Be sure the extension cord is the proper size (wire-gauge) to handle the electric load that will be plugged into it.
- 2.7 Ensure the generator is properly grounded prior to each use.
- 2.8 Using a portable generator to tie into the wiring of an existing structure shall be done only by a licensed electrician.
- 2.8.1 Potential Hazards include:
- Lifting, carrying, and pulling starter cords;
 - Burns from contact with the hot muffler or engine;
 - Shocks/electrocution;
 - Noise exposure; and
 - Inhaling exhaust gases, CO.
- 2.8.2 Training Requirements include:
- Review of applicable standard operating procedures;
 - Back Injury Prevention;
 - Demonstrated knowledge on the use of a generator; and
 - Review of manufacturers operating guidelines.
- 2.8.3 Level D PPE include:
- Leather Gloves;
 - Hearing Protection; and
 - Long Sleeve Shirt (i.e., to shield from burns, etc.).

2.8.4 Other Safety Tips include:

- Have a Class A:B:C fire extinguisher readily available at all times.

Americas

Energized Electrical Work Permit

S3NA-302-FM1

PART 1: To be completed by the requester

Job Work Number

- (1) Description of circuit/equipment/job location:
- (2) Description of work to be done:
- (3) Justification of why the circuit/equipment cannot be de-energized or the work cannot be deferred until the next scheduled outage:

Requester/Title

Date/Time

PART II: To be completed by the electrically qualified persons *doing* the work:

- | | |
|---|--|
| | Check When Complete |
| (1) Detailed job description procedure to be used in performing the above detailed work: | <input type="checkbox"/> |
| (2) Description of the Safe Work Practices to be employed: | <input type="checkbox"/> |
| (3) Results of the Shock Hazard Analysis: | <input type="checkbox"/> |
| (4) Determination of Shock Protection Boundaries: | <input type="checkbox"/> |
| (5) Results of Flash Hazard Analysis: | <input type="checkbox"/> |
| (6) Determination of the Flash Protection Boundary: | <input type="checkbox"/> |
| (7) Necessary personal protective equipment to safely perform the job: | <input type="checkbox"/> |
| (8) Means employed to restrict the access of unqualified persons from the work area: | <input type="checkbox"/> |
| (9) Evidence of completion of a Job Briefing including discussion of any job-related hazards: | <input type="checkbox"/> |
| (10) Do you agree that the above described work can be done safely?
(If <i>no</i> , return to requester) | <input type="checkbox"/> Yes <input type="checkbox"/> No |

Electrically Qualified Persons(s)

Date/Time

Electrically Qualified Persons(s)

Date/Time

Electrically Qualified Persons(s)

Date/Time

Electrically Qualified Persons(s)

Date/Time

Authorized by: _____
Authorized Supervisor Date/Time

Notes:

Electrical Regulations

1.0 Regulations

Jurisdiction	Regulation
United States	
OSHA	<ul style="list-style-type: none"> National Fire Protection Association (NFPA) Publication 70, National Electrical Code Occupational Health and Safety Administration 29 CFR 1910, Subpart S Electrical Occupational Health and Safety Administration 29 CFR 1926, Subpart K Electrical
Canada	
Alberta	<ul style="list-style-type: none"> OHS Code (2009) Sect 225 – 227, Schedule 4 Alberta Electrical and Communication Utility Code (2002)
British Columbia	<ul style="list-style-type: none"> OHS Regulation (1998) Sect 19.1 – 19.40 Electrical Safety Electrical Safety Regulation, B.C. Reg. 100/2004
Manitoba	<ul style="list-style-type: none"> Workplace Health and Safety Regulation (217/2006) Sect 25.0 – 25.8, 26.45, 38.1 – 38.17
New Brunswick	<ul style="list-style-type: none"> OHS Regulation (91-191) Sect 286 – 298
Newfoundland/Labrador	<ul style="list-style-type: none"> OHS Regulations, 2012 (N.L.R. 5/12) Part XXVI
Nova Scotia	<ul style="list-style-type: none"> Occupational Safety General Regulations (N.S. Reg. 44/99) Sect 120 – 128
NWT/Nunavut Territories	<ul style="list-style-type: none"> General Safety Regulations (R.R.N.W.T. 1990, c. S-1), section 96
Ontario	<ul style="list-style-type: none"> Reg. 213/91 Sect 181 – 195.3 Reg. 851 Sect 41, 60
Prince Edward Island	<ul style="list-style-type: none"> OHS Regulations (EC180/87) Sect 36.1 – 36.44
Quebec	<ul style="list-style-type: none"> OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 331 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 4) Sect 2.11.1 – 2.11.6, 5.1.1 – 5.3.1, Schedule 7
Saskatchewan	<ul style="list-style-type: none"> OHS Regulation (R.R.S., c. O-1, r. 1) Sect 450 – 466, Schedule Table 22
Yukon Territory	<ul style="list-style-type: none"> OHS Regulations (O.I.C. 2006/178) Sect 9.18 – 9.20

2.0 Standards

Canada	<ul style="list-style-type: none"> C22.1-98, Canadian Electrical Code - Part I Canadian Standards Association
United States	<ul style="list-style-type: none"> The National Electrical Safety Code (NESC) ANSI Standard C2

Hand and Power Tools

1.0 Purpose and Scope

- 1.1 Provides the AECOM requirements for all manually operated hand and power tools and equipment use, handling and storage.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.

2.0 Terms and Definitions

- 2.1 None

3.0 References

- 3.1 S3NA-003-PR1 SH&E Training
- 3.2 S3NA-205-PR1 Equipment Inspections & Maintenance
- 3.3 S3NA-208-PR1 Personal Protective Equipment Program
- 3.4 S3NA-302-PR1 Electrical, General
- 3.5 S3NA-410-PR1 Hazardous Energy Control
- 3.6 S3NA-510-PR1 Hearing Conservation Program

4.0 Procedure

- 4.1 Roles and Responsibilities
 - 4.1.1 **Project Managers/Field Task 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 attachments, appropriate guidelines shall be established prior to work associated with that equipment, including following manufacturer's recommendations.
 - 4.1.2 **Region Safety, Health and Environment (SH&E) Manager** – Provide technical guidance and support as to this procedure.
 - 4.1.3 **Employees** – No work with any tool that they are not familiar with without first obtaining training associated with that equipment. In addition, **employees** must following manufacturer's recommendations for its use and must not modify the equipment without first obtaining authorization from the manufacturer.
- 4.2 Restrictions
 - 4.2.1 No **employee** shall use any hand tool, unless they are familiar with the use and operation of the equipment or have received specific instruction on its use and operation.
 - 4.2.2 All tools will be used in accordance with manufacturer's specifications.
- 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. Refer to the attachments section for specifics and occurrence in the employee's Training Needs Assessment (TNA) per the *S3NA-003-PR1 SH&E Training* procedure.

4.4 Personal Protective Equipment

4.4.1 Lockout devices (padlocks, multiple lock hasps, tags), gloves appropriate to the task, safety-toed boots, as required, hard hats and eye and face protection, as required and in accordance with the *S3NA-208-PR1 Personal Protective Equipment Program*.

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'. Tagged tools will be returned to the supervisor for repair or replacement. Tagged tools will be immediately removed from service.

4.5.2 All tools must be inspected to manufacture's specifications according to tool rests and guard adjustment tolerances. All tools will be inspected to ascertain that all safety devices are present and functioning properly in accordance with the *S3NA-205-PR1 Equipment Inspections & Maintenance* procedure.

5.0 Records

5.1 None

6.0 Attachments

- 6.1 S3NA-305-WI1 Chainsaw Safety Card
- 6.2 S3NA-305-WI2 Circular Saw Safety Card
- 6.3 S3NA-305-WI3 Cut Off Saw Safety Card
- 6.4 S3NA-305-WI4 Handheld Grinder Safety Card
- 6.5 S3NA-305-WI5 Impact Wrench Safety Card
- 6.6 S3NA-305-WI6 Nail Gun Safety Card
- 6.7 S3NA-305-WI7 Dustless Vacuum Safety Card
- 6.8 S3NA-305-WI8 Power Drill Safety Card
- 6.9 S3NA-305-WI9 Pressure Washer Safety Card
- 6.10 S3NA-305-WI10 Reciprocating Saw Safety Card
- 6.11 S3NA-305-WI11 Sander Safety Card
- 6.12 S3NA-305-WI12 Utility Knife Safety Card
- 6.13 S3NA-305-WI13 Wood Chipper Safety Card
- 6.14 S3NA-305-WI14 Clearing and Grubbing Equipment Safety Card
- 6.15 S3NA-305-WI15 Pneumatic Tools Safety Card
- 6.16 S3NA-305-WI16 Manual Hand Tools Safety Card
- 6.17 S3NA-305-WI17 Small Engines Safety Card
- 6.18 S3NA-305-WI18 Electric and Battery Powered Hand Tools Safety Card
- 6.19 S3NA-305-GL1 Hand and Power Tools Guide

Americas

Chainsaw Safety Card

S3NA-305-WI1

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 begins with training.
- 1.3 Additional safety measures include proper training, good body mechanics and felling technique, well-maintained equipment, and protective clothing.

2.0 Safe Operating Guidelines

- 2.1 A sharp chainsaw is safer than a dull one. Keep the saw clean, lubricated, and adjusted. Before starting work inspect and test the chain brake, chain catch, throttle lock, handles and guards, all nuts and bolts, spark arrestor, and muffler and air filter. The chain tension should be properly adjusted and the carburetor tuned. Never "drop start" the saw.
- 2.2 A chainsaw is not only dangerous to the operator but also to surrounding persons. Keep the saw close to the body. Bend from the knees, not the waist. Improper lifting techniques and poor posture contribute to injuries.

3.0 Potential Hazards

- 3.1 Kickback – Sudden and violent reverse movement of the saw
- 3.2 Hand/arm vibration
- 3.3 Noise
- 3.4 Flying/falling debris
- 3.5 Severe cuts



Blade nose strikes another object



Improper starting of bore



Top or blade nose touches bottom or side of kerf during reinsertion

Avoid Situations That Can Cause Kickback

4.0 Training Requirements

- 4.1 Review of training requirements per the Training Needs Assessment (TNA).
- 4.2 Demonstrated knowledge on the use of a chainsaw.
- 4.3 Review of manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Debris Shield
- 5.2 Chainsaw Chaps
- 5.3 Leather Gloves
- 5.4 Hearing Protection

6.0 Other Safety Tips

- 6.1 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.

- 6.2 Determine where the tree/limb will fall prior to cutting. Always ensure that personnel and equipment are not in the path of the falling tree/log, and that you have time to move away. If necessary, flag/or fence off the area to prevent entry.
- 6.3 Always stand to one side of the limb you are to cut, never straddle it.
- 6.4 Always keep in mind where the chain will go if it breaks; never position yourself or other people in line with the chain.
- 6.5 Keep the chain out of the dirt, debris will fly, the teeth will be dulled and the chain life shortened.

Americas

Circular Saw Safety Card

S3NA-305-WI2

1.0 Objective / Overview

- 1.1 The circular saw is used in cutting wood products (i.e., plywood, construction lumber, etc.).
- 1.2 Safe measures for use include proper training, good body mechanics and felling technique, well-maintained equipment, and protective equipment. Potential Hazards
- 1.3 Kickback – Sudden and violent reverse movement of the saw
- 1.4 Noise
- 1.5 Flying debris
- 1.6 Sharp, moving blade (severe cuts)



2.0 Safe Operating Guidelines

- 2.1 Use sharp blades. Dull blades cause binding, stalling and possible kickback.
- 2.2 Use the correct blade for the application and check for proper operation before each cut.
- 2.3 Check often to ensure that guards return to their normal position quickly. Never defeat the guard to expose the blade.
- 2.4 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.
- 2.5 Secure the work being cut to avoid movement.
- 2.6 For maximum control, hold the saw firmly with both hands after securing the work piece.
- 2.7 Keep the upper and retracting lower blade guard and the motor free from dust.
- 2.8 Do not hold or force the retracting lower guard in the open position.
- 2.9 Do not over tighten the blade-locking nut.
- 2.10 Do not twist the saw to change, cut or check alignment.
- 2.11 Do not use a saw that vibrates or appears unsafe in any way.
- 2.12 Do not force the saw during cutting.
- 2.13 Do not cut materials without first checking for obstructions or other objects such as nails and screws.
- 2.14 Check frequently to be sure clamps remain secure.
- 2.15 Avoid cutting small pieces that can't be properly secured and material on which the saw shoe can't properly rest.
- 2.16 Do not overreach. Keep proper footing and balance.
- 2.17 When you start the saw, allow the blade to reach full speed before contacting the work piece.



3.0 Training Requirements

- 3.1 Review of training requirements per the Training Needs Assessment (TNA).
- 3.2 Demonstrated knowledge on the use of a circular saw.
- 3.3 Review and follow manufacturer's operating guidelines.

4.0 Personal Protective Equipment (Level D PPE)

- 4.1 Leather Gloves
- 4.2 Safety glasses
- 4.3 Hearing Protection

5.0 Other Safety Tips

- 5.1 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.
- 5.2 Disconnect power supply before adjusting or changing the blade.
- 5.3 Do not place hand under or in front of the shoe or guard of the saw when operating.
- 5.4 Cut at the proper depth ($\frac{1}{4}$ inch/ 0.64 centimeter) below work surface (see picture). Set the depth of the blade prior to use, when the saw is unplugged.
- 5.5 Circular saw must be double-insulated or protected by a ground fault circuit interrupter.

Americas

Cut off Saw Safety Card

S3NA-305-WI3

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 Potential Hazards

- 2.1 Noise
- 2.2 Flying debris
- 2.3 Sharp, moving blades (severe cuts)
- 2.4 Burns from engine
- 2.5 Fire hazard from sparks and gasoline
- 2.6 Hand/arm vibration
- 2.7 Kickback – Sudden and violent reverse movement of the saw



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3.0 Safe Operating Guidelines

- 3.1 **Pre-start checks** - Inspect the abrasive wheel for cracks and chips. If cracked or chip replace wheel before use. Ensure guard is positioned properly prior to start-up (*S3NA-411-PR1 Machine Guarding*). Make sure the fuel cap is properly secured.
- 3.2 **Starting** - Start the saw on firm ground or other solid surface in an open area. Never attempt to drop-start the engine (see picture). Clear the working area. Avoid operating the saw if the terrain is wet and/or frozen.
- 3.3 **Handling** - 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. Carry the saw with engine stopped, muffler away from your body, while protecting the cutting wheel from striking the ground or other objects.
- 3.4 **Cutting** - Begin cutting at full throttle and continue at full throttle until the cut is finished. Avoid standing in a direct line with the cutting wheel. Use only downward pressure on the saw, as lateral pressure may cause the blade to break and shatter. Do not change the direction of the cut once started, as this can also cause the blade to break and shatter. Do not use abrasive-type wheels for rough grinding. Do not cut above shoulder height.
- 3.5 **Maintenance** - Shut off the engine and remove the spark plug wire before adjusting or working on the saw.

4.0 Training Requirements

- 4.1 Review of training requirements per the Training Needs Assessment (TNA).
- 4.2 Demonstrated knowledge on the use of a cut off saw.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Face shield
- 5.2 Chainsaw Chaps

- 5.3 Hearing protection: earplugs and/or earmuffs
- 5.4 Respirator if required (concrete operations)

6.0 Other Safety Tips

- 6.1 Keep flammable and combustible materials away from saw while cutting metal.

Americas

Handheld Grinder Safety Card

S3NA-305-WI4

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 Flying debris
- 2.3 Moving parts (severe cuts)
- 2.4 Fire hazard from sparks igniting nearby debris or objects
- 2.5 Noise
- 2.6 Hand/arm vibration



3.0 Safe Operating Guidelines

- 3.1 Basic safety rules can help prevent hazards associated with the use of handheld grinders:
 - 3.1.1 Never carry the tool by the cord (or the hose for pneumatic tools).
 - 3.1.2 Never yank the cord or the hose to disconnect the tool from the receptacle.
 - 3.1.3 Keep cords and hoses away from heat, oil, and sharp edges.
 - 3.1.4 Denergize tools when not in use, before servicing, and when changing accessories such as blades/bits/cutters.
 - 3.1.5 All observers should be kept at a safe distance from the work area.
 - 3.1.6 Always secure work with clamps or a vise, freeing both hands to operate the tool.
 - 3.1.7 Avoid accidental starting; do not hold a finger on the trigger/switch while carrying a powered tool.
 - 3.1.8 Tools should 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.
 - 3.1.9 Be sure to keep your footing and maintain proper balance.
 - 3.1.10 The proper apparel should be worn. Loose clothing or jewelry can become caught in moving parts.
 - 3.1.11 Inspect the tool before every use. Damaged tools must be removed from use and tagged "DO NOT USE".

4.0 Training Requirements

- 4.1 Review of training requirements per the Trainign Needs Assessment (TNA).
- 4.2 Demonstrated knowledge on the use of a handheld grinder.
- 4.3 Follow manufacturers operating guidelines, especially for proper grinding wheel attachment.

5.0 Personal Protective Equipment (PPE)

- 5.1 Leather gloves
- 5.2 Safety glasses with sideshields
- 5.3 Hearing protection: earplugs and/or earmuffs
- 5.4 Other PPE as necessary for the work site/activity

6.0 Other Safety Tips

- 6.1 Keep flammable and combustible materials away from the grinder.
- 6.2 Have a fire extinguisher on hand while using grinder.
- 6.3 Inspect the abrasive wheel for cracks and chips. If cracked or chipped, replace wheel before use.
- 6.4 Ensure safety guard(s) is positioned properly prior to start-up.
- 6.5 Never clamp a handheld grinder in a vice.

Impact Wrench Safety Card

S3NA-305-WI5

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 Drain water from air compressor tank and condensation from air lines.
- 3.2 Disconnect the tool from the air supply before lubricating or changing sockets. Impact wrench sockets and accessories must be used with this tool.
- 3.3 Do not use hand sockets and accessories. Select the required impact socket.
- 3.4 Connect tool to air hose of recommended size. The use of a quick connect set makes connecting easier.
- 3.5 Never use a wire, soft pin, or nail to hold the socket onto the square spindle of the impact wrench.
- 3.6 If the proper retaining device on the tool is broken, the tool should be repaired.
- 3.7 On applications where a low or critical level of torque is required, it is recommended that you impact each fastener lightly, and then perform the final tightening with a hand torque wrench.

4.0 Training Requirements

- 4.1 Review of training requirements per the Training Needs Assessment (TNA).
- 4.2 Demonstrated knowledge on the use of a electric drill.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves/anti-vibration gloves
- 5.2 Hearing protection

6.0 Other Safety Tips

- 6.1 Be sure no one is below when using the tool at heights.
- 6.2 The proper fastening torque may differ depending upon the kind or size of the bolt.

6.3 Check the torque with a torque wrench.

Americas

Nail Gun Safety Card

S3NA-305-WI6

1.0 Objective / Overview

- 1.1 Nail guns are useful tools, but must be handled with care.
- 1.2 Nail guns 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 Watch out for other crewmembers working near you.
- 3.2 Never let an inexperienced crewmember use a nail gun without supervised training.
- 3.3 Never use bottled gas as a power source for pneumatic tools.
- 3.4 Disconnect a nail gun before you service it.
- 3.5 Hold your hand a good 12 inches back from the ends of studs or joists when you are nailing.
- 3.6 Keep the gun properly aligned with your work both vertically and horizontally.
- 3.7 Never nail with the gun pointed toward you or anyone else on the job.
- 3.8 Never try to nail beyond your reach.

4.0 Training Requirements

- 4.1 Review of training requirements per the Trainign Needs Assessment.
- 4.2 Demonstrated knowledge on the use of a coring machine.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves
- 5.2 Hearing protection

6.0 Other Safety Tips

- 6.1 When you are moving about the work area keep your finger off the trigger until you are ready to fire. Make sure you have only placed the nose guard against the material you are going to nail together.
- 6.2 Never rest the gun against any part of your body, or try to climb a ladder with the gun cradled against your body.
- 6.3 Be aware of what is located behind the nailing surface. Never place hands or other body parts directly behind the nailing surface.

- 6.4 Use only for intended work.
- 6.5 Avoid nailing into knots as nail can splinter wood.
- 6.6 Never disable safety tip on gun.

Americas

Dustless Vacuum Safety Card

S3NA-305-WI7

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 grapppler for drum handling activities.



Worker is using the roto-peen (scabblers) attachment; VAC-PAC collection system shown with 55 gal drum.

2.0 Potential Hazards

- 2.1 Hazardous noise
- 2.2 Vibration
- 2.3 Tripping hazard from cables and hoses
- 2.4 Hot surfaces (vacuum unit)
- 2.5 Electrical (high voltage)
- 2.6 Pinch hazard
- 2.7 Back strain
- 2.8 High pressure air

3.0 Safe Operating Guidelines

- 3.1 Prior to use, a pre-operation inspection must be completed to determine if the unit is in safe working condition.
- 3.2 The vacuum unit should be placed a minimum of 50 feet (15.2 meters) away from the work area.
- 3.3 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.
- 3.4 Two workers should be used to maneuver the unit into place.
- 3.5 A minimum 10 feet (3 meters) clearance will be established around the unit while in operation.
- 3.6 Workers should be aware of their position in relation to the hoses and cable to minimize tripping hazards.
- 3.7 A competent person will train each worker in the operation of the unit.
- 3.8 Maintenance in excess of preventive maintenance activities (e.g., lubrication) will be performed by manufacturer personnel ONLY.

4.0 Personal Protective Equipment (Level D PPE ensemble)

- 4.1 Leather gloves (maintenance)
- 4.2 Tyvek suit (with hood)
- 4.3 Anti-vibration gloves (operation)
- 4.4 Hearing protection (plugs or muffs)

5.0 Other Safety Tips

- 5.1 Always know where the emergency stop is located.
- 5.2 Operators of a motorized drum grappler must be trained in agreement with the powered industrial truck standard.
- 5.3 Review *S3NA-302-PR1 Electrical, General* prior to refueling the electrical generator and/or compressor.

Americas

Power Drill Safety Card

S3NA-305-WI8

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 Potential Hazards

- 2.1 Electrical shock
- 2.2 Puncture wounds
- 2.3 Flying debris
- 2.4 Severe cuts
- 2.5 Fire
- 2.6 Burns (hot bits)
- 2.7 Manual handling (sprains/strains - wrist)



3.0 Safe Operating Guidelines

- 3.1 Check carefully for loose power cord connections and frays or damage to the cord. Keep all cords clear of the cutting area during drilling.
- 3.2 Replace damaged tool and extension cords immediately.
- 3.3 Always keep drill bits sharp.
- 3.4 Disconnect the power supply before changing or adjusting bit or attachments,
- 3.5 Do not use high speed steel (HSS) bits without cooling or using lubrication.
- 3.6 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.
- 3.7 The chuck key must be removed from the chuck before starting the drill. A flying key can be an injury-inflicting missile.
- 3.8 Secure workpiece being drilled to prevent movement.
- 3.9 Check auxiliary handles, if part of the tool. Be sure they are securely installed.
- 3.10 Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur.
- 3.11 Grasp the drill firmly by insulated surfaces.
- 3.12 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.
- 3.13 Do not overreach. Always keep proper footing and balance.
- 3.14 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 Training Requirements

- 4.1 Review of training needs per the Training Needs Assessment.
- 4.2 Demonstrated knowledge on the use of a power drill.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Safety glasses
- 5.2 Leather Gloves

6.0 Other Safety Tips

- 6.1 Electric drills must be double-insulated or plugged into a ground fault circuit interrupter outlet.
- 6.2 Never carry tool by cord or yank it to disconnect from receptacle.
- 6.3 Keep cord away from sharp edges.

Americas

Pressure Washer Safety Card

S3NA-305-WI9

1.0 Objective / Overview

- 1.1 High pressure washers can operate up to pressures of 5,000 pounds per square inch and come in a variety of types ranging from gas operated to electrical. If not used correctly and safely, pressure washers can be dangerous piece of work equipment.
- 1.2 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 Potential 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 Severe cuts

3.0 Safe Operating Guidelines

- 3.1 The gun valve must always be pointed at the work area, NEVER point the gun valve at yourself or another person.
- 3.2 High pressure washers shall be used to clean or decontaminate equipment, surfaces or structures only.
- 3.3 High pressure washers WILL NOT be used to clean or decontaminate workers or personal protective equipment while it is being worn.
- 3.4 Maintain a distance from the spray contact point to reduce noise exposure and risk of being struck by flying debris. Ensure that you are not overreaching and remain stable.
- 3.5 Always set the tripper safety lock when the gun valve is not in use.

4.0 Training Requirements

- 4.1 Review of training requirements per the Training Needs Assessment.
- 4.2 Demonstrated knowledge on the use of a pressure washer.
- 4.3 Review of manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Hard hat with faceshield
- 5.2 Heavy gloves
- 5.3 Hearing protection
- 5.4 PVC (or equivalent) rain suit



6.0 Other Safety Tips

- 6.1 Never fill a pressure washer fuel tank with fuel while the engine is running or if the engine is still hot.
- 6.2 Non-operators must remain a minimum of 25 feet from the operator.
- 6.3 High-pressure washing equipment should be cleaned often to avoid dirt buildup, especially around the trigger and guard area.
- 6.4 Always set the trigger safety lock when the gun valve is not in use.
- 6.5 Relieve the pressure in the system before coupling and uncoupling hoses.
- 6.6 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.

Americas

Reciprocating Saw Safety Card

S3NA-305-WI10

1.0 Objective / Overview

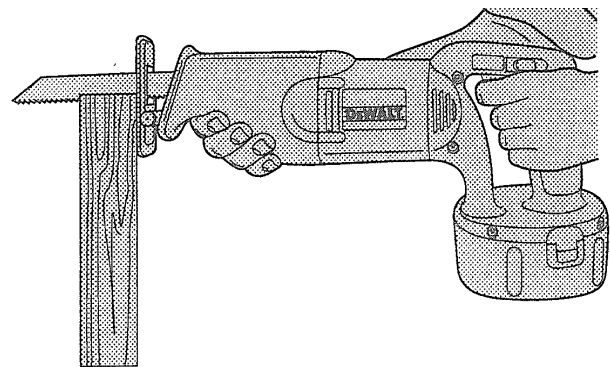
- 1.1 The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials have made it a widely used tool.
- 1.2 By design, it is a simple tool to handle. Its demands for safe use, however, are very important.

2.0 Potential Hazards

- 2.1 Flying debris
- 2.2 Noise
- 2.3 Sharp, moving parts (cuts)
- 2.4 Hand/arm vibration

3.0 Safe Operating Guidelines

- 3.1 Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.
- 3.2 Position yourself to maintain full control of the tool, and avoid cutting above shoulder height.
- 3.3 To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job.
- 3.4 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.
- 3.5 Maintain firm contact between the saw's shoe and the material being cut.
- 3.6 When making a "blind" cut (you can't see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut.
- 3.7 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.
- 3.8 Water pipes must be drained and capped.
- 3.9 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.
- 3.10 Different work surfaces demand different blades.



The correct way to hold the reciprocating saw while operating.

4.0 Training Requirements

- 4.1 Review of training requirement per the Training Needs Assessment (TNA).
- 4.2 Demonstrated knowledge on the use of a reciprocating saw.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Safety glasses
- 5.2 Hearing protection

6.0 Other Safety Tips

- 6.1 Do not operate reciprocating saw in explosive atmospheres.
- 6.2 Do not overreach. Keep proper footing and balance at all times.
- 6.3 Do not use tool if switch is not operating correctly.
- 6.4 Check for misalignment or binding of moving parts, breakage or parts and any other condition that may affect the tool's operation.
- 6.5 Do not wear jewelry on the fingers/wrists during use.
- 6.6 Always use two hands to operate saw (see picture).

Americas

Sander Safety Card

S3NA-305-WI11

1.0 Objective / Overview

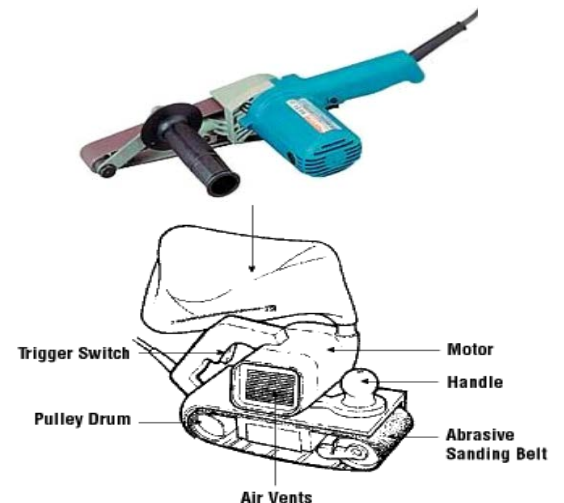
- 1.1 Sanders are commonly used at project sites for a variety of tasks.
- 1.2 Often times the hazards associated with sanders are overlooked; they don't appear threatening because they don't have sharp blades or bits. These misconceptions can be prevented through proper training and personal protective 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 cuts
- 2.7 Electrocutation
- 2.8 Explosion/fire hazard from the dust

3.0 Safe Operating Guidelines

- 3.1 Make sure the sander is switched "OFF" before connecting the power supply.
- 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.
- 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.
- 3.11 Empty the collector when $\frac{1}{4}$ 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 Training Requirements

- 4.1 Review of training requirements per the Training Needs Assessment (TNA).
- 4.2 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Hearing protection
- 5.2 Safety Glasses
- 5.3 Leather gloves

Utility Knife Safety Card

S3NA-305-WI12

1.0 Objective / Overview

- 1.1 Utility 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 correctly using a utility knife will drastically reduce the potential of cut-related injuries.

2.0 Safe Operating Guidelines

- 2.1 Always be sure that knives are sharp and not dull. A dull blade will require more force to cut, increasing the likelihood of slipping.
- 2.2 Be sure the blade is seated in the frame of the knife correctly, closed, and fastened together properly.
- 2.3 Always keep body parts away from the cut line, (e.g., fingers), and ensure that the material being cut is on firm ground and not against a body part (e.g. cutting rope against your leg).
- 2.4 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).
- 2.5 Always retract the blade when not in use.

3.0 Potential Hazards

- 3.1 Lacerations from direct contact with the blade.
- 3.2 Lacerations from blade breaking or shattering.
- 3.3 Ergonomics.



4.0 Training Requirements

- 4.1 Review of Applicable Standard Operating Procedures.
- 4.2 Review of client-specific requirements.
- 4.3 Demonstrated knowledge on the safe use of a utility knives.
- 4.4 Review and follow manufacturers operating guidelines for specialized or unusual knives.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Cut resistant gloves (Kevlar, thick leather, etc.).

6.0 Other Safety Tips

- 6.1 Purchase safety-equipped utility knives with guarding or automatically retracting blades.
- 6.2 Replace dull blades – When knife begins to tear rather than cut, it is a good indicator the blade is dull.
- 6.3 Always wear a cut-resistant glove on your free hand.
- 6.4 Always use the right tool for the job – NEVER use the blade as a screwdriver or prying tool.
- 6.5 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.

- 6.6 When changing blades, always handle from the non-sharp side. Cover blade with duct tape and dispose.
- 6.7 Use an alternate tool when possible (scissors, wire cutters, etc.).



Americas

Wood Chipper Safety Card

S3NA-305-WI13

1.0 Objective / Overview

- 1.1 Wood chippers should be used with extreme caution in order to prevent personal injury, as the wood chipper is open to receive tree branches and other wooden material.
- 1.2 AECOM only allows trained, authorized personnel to operate a wood chipper.
- 1.3 Along with training, other safety measures include: reviewing the manufacturers instructional booklet, proper maintenance of equipment, and personal protective equipment.

2.0 Safe Operating Guidelines

- 2.1 The operator must be completely familiar with the controls and proper use of the equipment.
- 2.2 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.
- 2.3 Prior to use, make sure all safety devices and controls, such as emergency shut-off devices, are tested and verified to be functioning properly.
- 2.4 Make sure two workers (buddy system) are in close contact with each other when operating the chipper.

3.0 Potential Hazards

- 3.1 Burns from contact with the hot muffler or engine.
- 3.2 Flying debris.
- 3.3 Noise exposure.
- 3.4 Exhaust fumes exposure.
- 3.5 Entanglement in limbs and contact with chipper blades.



4.0 Training Requirements

- 4.1 Review of Applicable Standard Operating Procedures.
- 4.2 Demonstrated knowledge on the use of a wood chipper.
- 4.3 Review of manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves
- 5.2 Hearing protection
- 5.3 Debris shield
- 5.4 Long sleeve shirt (e.g. working near poison ivy, poison oak, etc.)

6.0 Other Safety Tips

- 6.1 Stand to the side of the chipper while inserting limbs into chipper, never stand directly in front.
- 6.2 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.
- 6.3 Bystanders should be kept at least 25 feet away when in operation.
- 6.4 Keep the area around the wood chipper free of tripping hazards.
- 6.5 Never wear loose clothing that may get caught on feed material or moving parts.
- 6.6 Always set the trigger safety lock when the gun valve is not in use.
- 6.7 Never fill the fuel tank while the engine is running or if the engine is still hot.

Americas

Clearing and Grubbing Equipment Safety Card

S3NA-305-WI14

The following safety precautions will be followed during site clearing and tree falling

1.0 Hand Tools

- 1.1 All hand tools shall be in safe condition. Tools shall be inspected by the user daily.
- 1.2 Handles shall be sound, straight and tight-fitting.
- 1.3 Driven tools shall be dressed to remove any mushrooming.
- 1.4 Cutting tools shall be kept sharp and properly shaped.
- 1.5 All clearing activities shall terminate during electrical storms and periods of high winds.
- 1.6 Dead, broken or rotted limbs or trees (widow makers) shall be felled first.
- 1.7 Always wear the appropriate Personal Protective Equipment (PPE) when using hand tools, particularly eye and hand protection.
- 1.8 Use the right tool that is being used for the job to reduce chance of unexpected occurrences. Do not submit or use makeshift tools.
- 1.9 Defective tools shall not be used. They shall be taken out of service until repaired or replaced.
- 1.10 Check tools for damage or wear prior to each use to reduce chance of unexpected occurrences.
- 1.11 Replace cracked or broken handles on files, hammers, screwdrivers, or sledges.
- 1.12 Replace worn jaws on wrenches, pipe tools, and pliers
- 1.13 Redress burred or mushroomed heads on striking tools.
- 1.14 Sharpen cutting tools frequently to reduce chance of unexpected occurrences.
- 1.15 Store hand tools properly after each use.
- 1.16 Tools shall be clean and dry to avoid slippage when in use.
- 1.17 Never leave tools on ladders, scaffolds, or overhead work areas when they are not in use (a high number of injuries occur from objects/tools falling from overhead work areas in construction).
- 1.18 Always keep tools being used in overhead work areas in containers that will prevent them from falling.
- 1.19 Carry tools using a heavy belt or apron and hang tools at your sides.
- 1.20 Never carry tools in your pockets or hanging behind your back.
- 1.21 Avoid muscle strain and fatigue by doing the following:
 - Avoid using hand tools with your wrist bent.
 - Choose tools that allow you to keep your wrist straight when using them.
 - Always PULL on wrenches and pliers. Never push unless you hold the tool with your palm open.
 - Always cut away from yourself when using cutting tools.
- 1.22 Establish balance and stable footing when using a bar for prying. Pry bars can slip or break without warning.
- 1.23 Be aware of the presence of other personnel when using any tool, especially picks or axes.

2.0 Machete Use

- 2.1 A machete will only be used for its designated purpose; do not carelessly swing the machete when it is not needed.
- 2.2 To prevent lacerations, employees will wear Kevlar gloves and Kevlar chain saw chaps.
- 2.3 Machetes 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 leather gloves 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 *S3NA-305-W11 Chainsaw Safety Card*.

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 Access covers and doors shall not be opened until the drum or disk is at a complete stop.
- 6.2 Infeed and discharge ports shall be designed to prevent employee contact with disc, knives and blower blades.

7.0 Cutting Tools

- 7.1 Wear safety glasses and protective gloves when using cutters.
- 7.2 Choose the proper cutter for the job. Cutters are designed for a specific type, hardness, and size of material.
- 7.3 Inspect the tool for proper working condition.

- 7.4 If tool is designed to have a guard, make sure guards are in place.
- 7.5 Cut materials straight across - keep the material being cut at right angles to the cutting edges of jaws.
- 7.6 Warn those in the area to take precautionary measures to avoid possible injury from flying metal pieces.
- 7.7 Keep cutting tools in good repair.
- 7.8 Adjust and lubricate cutter and moving parts daily if heavily used.
- 7.9 Sharpen jaws according to manufacturer's instructions.
- 7.10 Do not use a cutting tool until you are trained in its proper and safe use.
- 7.11 Do not use cushion grip handles for jobs requiring electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
- 7.12 Do not use cutters which are cracked, broken or loose.
- 7.13 Do not exceed the recommended capacity of a tool.
- 7.14 Do not cut diagonally.
- 7.15 Do not rock cutters from side to side when cutting wire.
- 7.16 Do not pry or twist with tool when cutting.
- 7.17 Do not hammer on cutting tools or extend the handle length to achieve greater cutting power.
- 7.18 Do not expose cutters to excessive heat.

8.0 Selection and Use

- 8.1 Select tools that can be used without bending the wrist. Hand tools should allow the operator to grasp, hold, and use the tool with the wrist held straight.
- 8.2 Select the tool with the workplace layout and job design in mind. Sometimes a tool is correct for one operation and incorrect for another.
- 8.3 Use the right tool for the job. Confirm it is the right size and has sufficient power to do the job safely. When there is a choice, select a tool of a low weight.
- 8.4 Select low-vibrating tools, or choose tools with vibration-absorbing handles, like those covered with cork, rubber, plastic or plastic bonded to steel, to reduce hand/arm vibration.
- 8.5 Choose hand tools that have a center of gravity within or close to the handle.
- 8.6 Select tools with rounded and smooth handles that you can grip easily.
- 8.7 If they are available, choose hand tools with double handles to permit easier holding and better manipulation of the tool.
- 8.8 Select tools with a trigger strip, rather than a trigger button. This strip will allow you to exert more force over a greater area of the hand that, in turn, will reduce muscle fatigue.
- 8.9 Confirm that the trigger works easily to reduce the effort needed to operate it.
- 8.10 Confirm that your tool is well maintained and in good repair.
- 8.11 Frequently used tools that weigh more than 1 pound should be counter-balanced.
- 8.12 Hold the tool close to the body. Do not overreach.
- 8.13 Keep good balance and proper footing at all times. This will help operators to control the tool better, especially in response to unexpected situations.
- 8.14 Rest your hands by putting the tool down when you are not using it.

- 8.15 Reduce power to the lowest setting that can complete the job safely. This action reduces tool vibration at the source.
- 8.16 Confirm that cutting tools, drill bits, etc., are kept sharp, clean, and well maintained.
- 8.17 Do not wear gloves, loose clothing or jewelry while using revolving power tools. Tie back long hair or wear appropriate hair protection to prevent hair from getting caught in moving parts of equipment (manufacturer's operating manual for recommended PPE and/or safety issues/concerns).
- 8.18 Do not use a tool unless you have been trained to use it safely and know its limitations and hazards.

9.0 Storage and Handling

- 9.1 All tools shall be stored in a manner to prevent damage and injury. Store tools in a dry, secure location when they are not being used.
- 9.2 Tools shall be properly put away after each use.
- 9.3 Sharp or pointed tools shall be handled only if the sharp/pointed edge is covered, carried in a tool box or other device designed for that purpose, or the sharp/pointed edge is pointed downward, away from the body.

Pneumatic Tool Safety Card

1.0 General Requirements

- 1.1 Wear safety glasses at all times and face shield if required. (Level "D" Personal Protective Equipment required).
- 1.2 Use hearing protection, where required.
- 1.3 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.
- 1.4 Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions.
- 1.5 Use only the attachments that the manufacturer recommends for the tools you are using.
- 1.6 Be careful to prevent hands, feet, or body from injury in case the machine slips or the tool breaks.
- 1.7 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.
- 1.8 Use the proper hose and fittings of the correct diameter.
- 1.9 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.
- 1.10 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.
- 1.11 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.
- 1.12 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.
- 1.13 Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection (e.g., chain, wire, or positive locking device).
- 1.14 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.
- 1.15 Do not operate the tool at a pressure above the manufacturer's rating.
- 1.16 Turn off the air pressure to the hose when not in use or when changing power tools.
- 1.17 Do not carry a pneumatic tool by its hose.
- 1.18 Avoid creating trip hazards caused by hoses laid across walkways or curled underfoot.
- 1.19 Do not use compressed air to blow debris or to clean dirt from clothes.

2.0 Pneumatic Nailing and Stapling Tools

- 2.1 Permit only experienced and trained persons to operate pneumatic nailing and stapling tools.
- 2.2 Wear safety glasses or face a shield and, where necessary, use hearing protection.
- 2.3 Inspect a tool before connecting it to air supply:
 - 2.3.1 Check tool safety mechanisms if applicable.
 - 2.3.2 Tighten securely all screws and cylinder caps.
- 2.4 Check correct air supply and pressure before connecting a tool.
- 2.5 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.

- 2.6 Always handle a tool as if it loaded with fasteners (nails, staples, etc.).
- 2.7 Equip tools with a work-contacting element that limits the contact area to one that is as small as practical.
- 2.8 Make sure that the mechanical linkage between the work-contacting element and trigger is enclosed.
- 2.9 Disconnect a tool from the air supply when the tool is unattended and during cleaning or adjustment. Before clearing a blockage, be sure that depressing the trigger exhausts all air from the tool.
- 2.10 Use only fasteners recommended by the manufacturer.
- 2.11 Permit only properly trained people to carry out tool maintenance.
- 2.12 Do not depress the trigger unless the nosepiece of tool is directed onto a safe work surface.
- 2.13 Do not carry a tool with the trigger depressed.
- 2.14 Do not load a tool with fasteners while the trigger is depressed.
- 2.15 Do not overreach. Keep proper footing and balance.

Manual Hand Tools Safety Card

1.0 Hammers

- 1.1 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.
- 1.2 Choose a hammer with a striking face diameter approximately $\frac{1}{2}$ inch (1.3 centimeters) larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).
- 1.3 Ensure that the head of the hammer is firmly attached to the handle.
- 1.4 Replace loose, cracked or splintered handles.
- 1.5 Discard any hammer with mushroomed or chipped face or with cracks in the claw or eye sections.
- 1.6 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).
- 1.7 Look behind and above you before swinging the hammer.
- 1.8 Watch the object you are hitting.
- 1.9 Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.
- 1.10 Do not use a hammer with a loose or damaged handle.
- 1.11 Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head.
- 1.12 Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.
- 1.13 Do not use a hammer for any purpose for which it was not designed or intended.
- 1.14 Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.
- 1.15 Do not redress, grind, weld or reheat-treat a hammer head.
- 1.16 Do not strike with the side or cheek of the hammer.

2.0 Wrenches

- 2.1 Inspect pipe wrenches periodically for worn or unsafe parts and replace them (e.g., check for worn threads on the adjustment ring and movable jaw).
- 2.2 Keep pipe wrench teeth clean and sharp.
- 2.3 Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.
- 2.4 Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.
- 2.5 Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.
- 2.6 Do not use pipe wrenches on nuts and bolts.
- 2.7 Do not use a pipe extender for extra leverage. Get a larger pipe wrench.
- 2.8 Replace pipe cutter wheels which are nicked or otherwise damaged.
- 2.9 Use a three- or four-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.

- 2.10 Choose a cutting wheel suitable for cutting the type of pipe material required:
 - 2.10.1 Thin wheel for cutting ordinary steel pipe.
 - 2.10.2 Stout wheel for cutting cast iron.
 - 2.10.3 Other wheels for cutting stainless steel, plastic and other materials.
- 2.11 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.
- 2.12 Use a proper tap wrench (with a “T” handle) for turning a tap.
- 2.13 Use lubricant or machine cutting fluid with metals other than cast iron.
- 2.14 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.
- 2.15 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.
- 2.16 Do not attempt to thread hardened steel. This can chip or damage the die.
- 2.17 Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.
- 2.18 Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

3.0 Pliers and Wire Cutters

- 3.1 Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.
- 3.2 Choose pliers or wire cutters that have a grip span of 2½ – 3½ inches (6.4 – 8.9 centimeters) to prevent your palm or fingers from being pinched when the tools are closed.
- 3.3 Use adjustable pliers that allow you to grip the work piece firmly while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).
- 3.4 Use tools only if they are in good condition.
- 3.5 Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.
- 3.6 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.
- 3.7 Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.
- 3.8 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.
- 3.9 Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.
- 3.10 Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.
- 3.11 Do not expose pliers or wire cutters to excessive heat.
- 3.12 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.
- 3.13 Do not use pliers as a hammer.

- 3.14 Do not hammer on pliers or wire cutters to cut wires or bolts.
- 3.15 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.
- 3.16 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.
- 3.17 Do not use pliers on nuts and bolts; use a wrench.

4.0 Screwdrivers

- 4.1 Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.
- 4.2 Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.
- 4.3 Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.
- 4.4 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 Pozi-driv screwdriver.
- 4.5 Use a vise or clamp to hold the stock if the piece is small or moves easily.
- 4.6 Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.
- 4.7 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.
- 4.8 Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).
- 4.9 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.
- 4.10 Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.
- 4.11 Use a screwdriver that incorporates the following features when continuous work is needed:
 - 4.11.1 Use a pistol grip to provide for a straighter wrist and better leverage.
 - 4.11.2 Use a "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.
 - 4.11.3 Use a ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.
- 4.12 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.
- 4.13 Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.
- 4.14 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.
- 4.15 Do not hold the stock in one hand while using the screwdriver with the other. If the screwdriver slips out of the slot you may cut your hand.
- 4.16 Do not hammer screws that cannot be turned.
- 4.17 Do not grind the tip to fit another size screw head.

- 4.18 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).
- 4.19 Do not use defective screwdrivers (e.g., ones with rounded or damaged edges or tips; split or broken handles; or bent shafts).
- 4.20 Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.
- 4.21 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.
- 4.22 Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.
- 4.23 Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.
- 4.24 Do not carry screwdrivers in your pockets.

5.0 Snips

- 5.1 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.
- 5.2 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.
- 5.3 Universal snips can cut in both straight and wide curves.
- 5.4 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.
- 5.5 Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.
- 5.6 Aviation snips have compound leverage that reduces the effort required for cutting.
- 5.7 Offset snips have jaws that are set at an angle from the handle.
- 5.8 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).
- 5.9 Use only snips that are sharp and in good condition.
- 5.10 Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.
- 5.11 Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.
- 5.12 Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.
- 5.13 Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.
- 5.14 Keep the nut and the pivot bolt properly adjusted at all times.
- 5.15 Oil the pivot bolt on the snips occasionally.
- 5.16 Do not try to cut sharp curves with straight cut snips.
- 5.17 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.
- 5.18 Do not hammer or use your foot to exert extra pressure on the cutting edges.

- 5.19 Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.
- 5.20 Do not attempt to re-sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

6.0 Wood Chisels

- 6.1 Wear safety glasses.
- 6.2 Wood chisels are made in various shapes and sizes and for many uses. Use the correct chisel for the job.
- 6.3 Use the right size of chisel for the job.
- 6.4 Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel.
- 6.5 Ensure that the cutting edge is sharp. Dull chisels can be difficult to control and require more effort to do the job.
- 6.6 Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling.
- 6.7 Clamp stock so it cannot move.
- 6.8 Adjust your stance so that you do not lose your balance if the tool slips.
- 6.9 Chip or cut away from yourself.
- 6.10 Keep your hands and body behind the cutting edge.
- 6.11 Use a wooden or plastic mallet with a large striking face on all chisels. Only heavy-duty or framing chisels are made of a solid or molded handle that can be struck with a steel hammer.
- 6.12 Make finishing or paring cuts with hand pressure alone.
- 6.13 Place chisels safely within the plastic protective caps to cover cutting edges when not in use.
- 6.14 Replace any chisel that is bent or shows dents, cracks, chips, or excessive wear.
- 6.15 Store chisels in a "storage roll," a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.
- 6.16 Replace broken or splintered handles.
- 6.17 Sharpen cutting edges as often as necessary.
- 6.18 Do not use a wood chisel as a pry or a wedge.
- 6.19 Do not use a wood chisel on metal.
- 6.20 Do not use an all-steel chisel with a mushroomed face or a chipped edge. Redress with a file or whetstone.
- 6.21 Do not use a grinder to redress heat-treated tools. Use a whetstone.
- 6.22 Do not use a dull chisel.

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.
- 7.2 Discard any 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.
- 7.4 Position your body in a way that will prevent you from losing balance and hurting yourself if the wrench slips or something (e.g., a bolt) suddenly breaks.

- 7.5 Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.
- 7.6 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.
- 7.7 Face an adjustable wrench "forward," adjust tightly and turn the wrench so pressure is against the permanent or fixed jaw.
- 7.8 Ensure that the teeth of a pipe wrench are sharp and free of oil and debris and that the pipe or fitting is clean to prevent unexpected slippage and possible injuries.
- 7.9 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.
- 7.10 Support the head of the ratchet wrench when socket extensions are used.
- 7.11 Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.
- 7.12 Stand aside when work is done with wrenches overhead.
- 7.13 Make sure adjustable wrenches do not "slide" open during use.
- 7.14 Keep tools well maintained (cleaned and oiled).
- 7.15 Clean and place tools and wrenches in a tool box, rack or tool belt after use.
- 7.16 Do not push on a wrench - losing your balance is more likely if the wrench slips.
- 7.17 Do not use a wrench that is bent or damaged.
- 7.18 Do not use worn adjustable wrenches. Inspect the knurl, jaw and pin for wear.
- 7.19 Do not pull on an adjustable wrench that is loosely adjusted.
- 7.20 Do not use pipe wrenches on nuts or bolts.
- 7.21 Do not use pipe wrenches for lifting or bending pipes.
- 7.22 Do not use a wrench on moving machinery.
- 7.23 Do not use the wrong tools for the job. For example, never use pliers instead of a wrench or a wrench as a hammer.
- 7.24 Do not use a makeshift wrench.
- 7.25 Do not insert a shim in a wrench for better fit.
- 7.26 Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.
- 7.27 Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.
- 7.28 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

- 9.1 Do not use a chisel that has a dull cutting edge.
- 9.2 Do not use chisels that have "mushroomed" striking heads.

- 9.3 Hold a chisel by using a tool holder if possible.
- 9.4 Clamp small work pieces in the vise and chip towards the stationary jaw when working with a chisel.

10.0 Vises

- 10.1 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.
- 10.2 Position the work piece in the vise so that the entire face of the jaw supports the work piece.
- 10.3 Do not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.
- 10.4 Do not slip a pipe over the handle of a vise to gain extra leverage.

11.0 Clamps

- 11.1 Do not use the C-clamp for hoisting materials.
- 11.2 Do not use the C-clamp as a permanent fastening device.

12.0 Jacks

- 12.1 Do not exceed the jack's rated lifting capacity as noted on the label of the jack.
- 12.2 Clear all tools, equipment and any other obstructions from under the vehicle before lowering the jack.

Americas

Small Engine Safety Card

S3NA-305-WI17

1.0 Objective / Overview

- 1.1 Operate small engine machines, such as push mowers, weed trimmers, and leaf blowers, in a safe manner.
- 1.2 You should be trained and competent in how to operate and maintain them in a safe manner.
- 1.3 Read the operator's manual. It will contain detailed information on the safe operation and maintenance of the machine. If you do not have a manual, ask if one can be obtained from the manufacturer.

2.0 Potential Hazards

- 2.1 Flying debris
- 2.2 Noise
- 2.3 Moving and sharp parts (cuts)
- 2.4 Hot surfaces (burns)

3.0 Safe Operating Guidelines

- 3.1 Do not wear loose or baggy clothing around tools with rotating parts.
- 3.2 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 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.
- 3.4 Never remove fuel cap or add fuel when engine is running.
- 3.5 Never start or operate the engine with the fuel fill cap removed.
- 3.6 Refuelling: allow engine to cool; fill in well-ventilated area; and do not smoke while re-fuelling.
- 3.7 Use only properly labelled, American National Standards Institute/Canadian Standards Association-approved red gasoline containers to store and dispense fuel.
- 3.8 Do not pour fuel from engine or siphon fuel by mouth.
- 3.9 Never leave the engine unattended while it is running.
- 3.10 Never operate the engine with an unguarded engine shaft.
- 3.11 Do not modify the engine or tamper with the factory setting of the engine governor.
- 3.12 Never operate the engine without a muffler guard in place and avoid touching hot areas of the engine.
- 3.13 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.
- 3.14 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.
- 3.15 Always wear hearing protection when operating an engine.

4.0 Training Requirements

- 4.1 Review of training requirements per the Training Needs Assessment (TNA).
- 4.2 Demonstrated knowledge on the use of small engine equipment.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Always wear safety glasses with shields
- 5.2 Leather or cotton gloves
- 5.3 Long pants and long sleeve shirt
- 5.4 Safety toe work boots
- 5.5 Hearing protection (earmuffs or earplugs)

Americas**Electrical and Battery Hand Tools Safety Card****S3NA-305-WI18**

All electrical tools and equipment must be operated in accordance with the requirements of *S3NA-302-PR1 Electrical, General*.

1.0 Safe Work Practices

- 1.1 Maintain all electrical tools and cords in good condition and not overloaded.
- 1.2 Do not wear loose or baggy clothing around tools with rotating parts.
- 1.3 The switch on the tool must be in the OFF position before connecting it to a power source.
- 1.4 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.
- 1.5 The tool must have an approved three-wire cord with a three-prong plug so that it can be used only in a properly grounded three-hole receptacle, unless the tool is double insulated to protect the operator from electrical shock.
- 1.6 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.
- 1.7 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.
- 1.8 Maintain electrical cords and appliances in good working order.
 - 1.8.1 Cords and appliances must be American National Standards Institute/Canadian Standards Association approved.
 - 1.8.2 Never carry an electric tool by the cord or disconnect the plug by pulling or jerking on the cord (can damage, loosen, or separate connections).
 - 1.8.3 Check cords frequently for such damage such as kinks, cuts, and cracked or broken outer jackets (any cord that feels more than comfortably warm to the touch should be checked by an electrician for overloading).
- 1.9 Store electrical cords in a clean, dry area off the ground to prevent damage to cord.
- 1.10 Equipment must have proper guards or shields and they must remain in place. 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.
- 1.11 Do not modify, remove, or disable any machine guards.
- 1.12 Stand to one side when engaging or disengaging an electrical circuit breaker to avoid electrical flash backs.
- 1.13 It's strongly advisable to use GFCI with all portable electric tools at any time.
- 1.14 A cord should not be pulled or dragged over nails, hooks, or other sharp objects that may cause cuts in the insulation. In addition, cords should never be placed on radiators, steam pipes, walls, and windows. Particular attention should be placed on connections behind furniture, since files and bookcases may be pushed tightly against electrical outlets, severely bending the cord at the plug.
- 1.15 Disconnect electrical equipment before cleaning, adjusting, or applying flammable solutions. If a guard is removed to clean or repair parts, replace it before testing the equipment and returning the machine to service.
- 1.16 Only authorized persons are permitted to activate, de-activate or lockout electrical equipment.

- 1.17 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.
 - 1.17.1 Switch off all appropriate devices (MCC, Distribution Panel, Disconnect).
 - 1.17.2 Lock and tag Electrical Supply devices in the "OFF" position.
 - 1.17.3 Test to be sure the equipment cannot be operated at the STOP-START switch.
 - 1.17.4 Test to be sure electrical equipment is de-energized.
 - 1.17.5 After completion of task, remove padlocks and destroy tags.

2.0 Inspection

- 2.1 Inspect tools for any damage prior to each use.
- 2.2 Ensure that the power tool has the correct guard, shield or other attachment that the manufacturer recommends.
- 2.3 Ensure that the tools are properly grounded using a three-prong plug, 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.
- 2.4 Check electric tools to ensure that a tool with a three-prong plug has an approved three-wire cord and is grounded. The three-prong plug should be plugged in a properly grounded three-pole outlet. If an adapter must be used to accommodate a two-hole receptacle, the adapter wire must be attached to a known, functioning ground. Never remove the third, grounding prong from a plug.
- 2.5 Check the handle and body casing of the tool for cracks or other damage.
- 2.6 If the tool has auxiliary or double handles, check to see that they installed securely.
- 2.7 Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
- 2.8 Any tool with a spring-operated trigger switch shall be fully functional.
- 2.9 Check for damaged switches and ones with faulty trigger locks.
- 2.10 Inspect the plug for cracks and for missing, loose or faulty prongs.
- 2.11 If a tool is defective, remove it from service, and tag it clearly "Out of service for repair." Replace damaged equipment immediately – do not use defective tools "temporarily." DO NOT ATTEMPT FIELD REPAIRS.

3.0 Battery Powered Tools

- 3.1 Use only the kind of battery that the tool manufacturer specifies for the battery-powered tool that you are using.
- 3.2 Recharge a battery-powered tool only with a charger that is specifically intended for the battery in that tool.
- 3.3 Remove the battery from the tool or ensure that the tool is switched off or locked off before changing accessories, making adjustments, or storing the tool.
- 3.4 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.

4.0 Using Electric Tools

- 4.1 Switch off the tools before connecting them to a power supply.
- 4.2 If a power cord feels more than comfortably warm or if a tool is sparking excessively, have it checked by an electrician or other qualified person.
- 4.3 Disconnect the power supply before making adjustments or changing accessories.
- 4.4 Remove any wrenches and adjusting tools before turning on a tool.
- 4.5 Inspect the cord for fraying or damage before each use. Tag defective tools clearly with an "Out of Service" tag and replace immediately with a tool in good running order.
- 4.6 During use, keep power cords clear of tools and the path that the tool will take.
- 4.7 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.
- 4.8 Use only approved extension cords that have the proper wire size for the length of cord and power requirements of the electric tool that you are using. This will prevent the cord from overheating.
- 4.9 For outdoor work, use outdoor extension cords marked "W-A" or "W."
- 4.10 Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.
- 4.11 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.
- 4.12 Pull the plug not the cord when unplugging a tool. Pulling the cord causes wear and may adversely affect the wiring to the plug - an electrical shock to the operator may result.
- 4.13 Keep power cords away from heat, water, oil, sharp edges and moving parts. They can damage the insulation and cause a shock.
- 4.14 Avoid accidental starting by ensuring the tool is turned off before you plug it in. Also do not walk around with a plugged-in tool with your finger touching the switch.
- 4.15 Do not bypass the ON/OFF switch and operate the tools by connecting and disconnecting the power cord.
- 4.16 Do not disconnect the power supply of the tool by pulling or jerking the cord from the outlet.
- 4.17 Do not leave a running tool unattended. Do not leave it until it has been turned off, has stopped running completely, and has been unplugged.
- 4.18 Do not use electric tools in wet conditions or damp locations unless tool is connected to a GFCI.
- 4.19 Do not expose electric power tools to rain or wet conditions; wet tools increase the likelihood for getting an electric shock.
- 4.20 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.
- 4.21 Do not plug several power cords into one outlet by using single-to-multiple outlet adapters or converters ("cube taps").
- 4.22 Do not use light duty power cords.
- 4.23 Do not connect or splice extension cords together to make a longer connection; the resulting extension cord may not be able to provide sufficient current or power safely.
- 4.24 Do not carry electrical tools by the power cord.
- 4.25 Do not tie power cords in knots; knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.

- 4.26 Never break off the third prong on a plug: replace broken three-prong plugs and make sure the third prong is properly grounded.
- 4.27 Never use extension cords as permanent wiring; use extension cords only as a temporary power supply to an area that does not have a power outlet.
- 4.28 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.
- 4.29 Do not brush away sawdust, shavings or turnings while the tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.
- 4.30 Do not operate tools in an area containing explosive vapors or gases.
- 4.31 Do not clean tools with flammable or toxic solvents.
- 4.32 Do not surprise or touch anyone who is operating a tool. Startling a tool operator could end up causing an accident or injury.

5.0 Belt Sanders

- 5.1 Refer to *S3NA-305-W111 Sander Safety Card*.

6.0 Drills

- 6.1 Refer to *S3NA-305-W18 Power Drill Safety Card*.

7.0 Planers

- 7.1 Wear safety glasses.
- 7.2 Disconnect the planer from the power supply before making any adjustments to the cutter head or blades.
- 7.3 Use blades of the same weight and set at the same height.
- 7.4 Ensure that the blade-locking screws are tight.
- 7.5 Remove adjusting keys and wrenches before turning on power.
- 7.6 Support the material (stock) in a comfortable position that will allow the job to be done safely and accurately.
- 7.7 Check stock thoroughly for staples, nails, screws, or other foreign objects before using a planer.
- 7.8 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.
- 7.9 Use two hands to operate a planer - one hand on the trigger switch and the other on a front handle.
- 7.10 Do not put your finger or any object in a deflector to clean out chips while a planer is running.
- 7.11 Disconnect the power supply when stopping to dump out chips.
- 7.12 Do not set a planer down until blades have stopped turning.
- 7.13 Keep all cords clear of cutting area.

8.0 Routers

- 8.1 Wear safety glasses.
- 8.2 Disconnect the power supply before making any adjustments or changing bits.
- 8.3 Ensure that the bit is securely mounted in the chuck and the base is tight.

- 8.4 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.
- 8.5 Secure stock. Never rely on yourself or a second person to support or hold the material. Sudden torque or kickback from the router can cause damage and injury.
- 8.6 Before using a router, check stock thoroughly for staples, nails, screws or other foreign objects.
- 8.7 Keep all cords clear of cutting area.
- 8.8 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.
- 8.9 Do not overreach. Keep proper footing and balance.
- 8.10 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.
- 8.11 When routing outside edges, guide the router counter clockwise around the work.
- 8.12 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.
- 8.13 Feed the router bit into the material at a firm, controlled speed.
- 8.14 With softwood, you can sometimes move the router as fast as it can go. With hardwood, knotty and twisted wood, or with larger bits, cutting may be very slow.
- 8.15 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.
- 8.16 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.
- 8.17 To decide the depth of cut and how many passes to make, test the router on scrap lumber similar to the work.

9.0 Circular Saws

- 9.1 Refer to *S3NA-305-WI2 Circular Saw Safety Card*.

10.0 Other Saws

- 10.1 Wear safety glasses.
- 10.2 Disconnect power supply before changing or adjusting blades.
- 10.3 Use lubricants when cutting metals.
- 10.4 Keep all cords clear of cutting area.
- 10.5 Position the saw beside the material before cutting and avoid entering the cut with a moving blade.
- 10.6 Make sure guards, if present, are installed and are working properly.
- 10.7 Remember sabre saws cut on the upstroke.
- 10.8 Secure and support stock as close as possible to the cutting line to avoid vibration.
- 10.9 Keeps the base or shoe of the saw in firm contact with the stock being cut.
- 10.10 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.
- 10.11 Set the blade to go no further than 1/8 to 1/4 inch deeper than the material being cut.

- 10.12 Do not start cutting until the saw reaches its full power.
- 10.13 Do not force a saw along or around a curve. Allow the machine to turn with ease.
- 10.14 Do not insert a blade into or withdraw a blade from a cut or lead hole while the blade is moving.
- 10.15 Do not put down a saw until the motor has stopped.
- 10.16 Do not reach under or around the stock being cut.
- 10.17 Maintain control of the saw always. Avoid cutting above shoulder height.
- 10.18 External Cuts
 - 10.18.1 Make sure that the blade is not in contact with the material or the saw will stall when the motor starts.
 - 10.18.2 Hold the saw firmly down against the material and switch the saw on.
 - 10.18.3 Feed the blade slowly into the stock, maintaining an even forward pressure.
- 10.19 Internal Cuts
 - 10.19.1 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.
 - 10.19.2 Do not let the blade touch the stock until the saw has been switched on.

Hand and Power Tools Guide

1.0 Exposure

- 1.1 **Employees** who use hand and power tools and are exposed to the hazards of falling, flying, abrasive, and splashing objects, or to harmful dusts, fumes, mists, vapors, or gases must be provided with the appropriate personal protective equipment (PPE) and training.

2.0 Basic Safety Rules

- 2.1 Keep all tools in good condition with regular maintenance.
- 2.2 Use the right tool for the job.
- 2.3 Examine each tool for damage before use and do not use damaged tools.
- 2.4 Operate tools according to the manufacturers' instructions.
- 2.5 Provide and use properly the right PPE.
- 2.6 All electrical connections for these tools must be suitable for the type of tool and the working conditions (wet, dusty, flammable vapors).
- 2.7 When a temporary power source is used for construction, a ground-fault circuit interrupter should be used.
- 2.8 Eye protection is required, and head and face protection is recommended for employees working with pneumatic tools.
- 2.9 Screens must also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.
- 2.10 Compressed air guns should never be pointed toward anyone.
- 2.11 Workers should never "dead-end" them against themselves or anyone else.
- 2.12 A chip guard must be used when compressed air is used for cleaning.
- 2.13 Use of heavy jackhammers can cause fatigue and strains. Heavy rubber grips reduce these effects by providing a secure handhold.
- 2.14 Workers operating a jackhammer must wear safety glasses and safety shoes that protect them against injury if the jackhammer slips or falls. A face shield also should be used.
- 2.15 Hand-arm vibration exposure is associated with the use of hand tools. Consider the need for controls such as limiting your tool use time, adjusting your grip to be loose but stable, and using anti-vibration gloves.
- 2.16 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.

3.0 Hazard Prevention Sharp Objects

- 3.1 **Employees**, when using saw blades, knives, or other tools, should direct the tools away from aisle areas and away from other employees working in close proximity.
- 3.2 Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones.
- 3.3 Cracked saw blades and grinder disc must be removed from service.
- 3.4 Wrenches must not be used when jaws are sprung to the point that slippage occurs.
- 3.5 Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads.

- 3.6 The wooden handles of tools must not be splintered.
- 3.7 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 should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.

4.0 Hazard Prevention of Power tools

4.1 Precautions

- 4.1.1 Never carry a tool by the cord or hose.
- 4.1.2 Never yank the cord or the hose to disconnect it from the receptacle.
- 4.1.3 Keep cords and hoses away from heat, oil, and sharp edges.
- 4.1.4 Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.
- 4.1.5 Keep all people not involved with the work at a safe distance from the work area.
- 4.1.6 Secure work with clamps or a vise, freeing both hands to operate the tool.
- 4.1.7 Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
- 4.1.8 Maintain tools with care; keep them sharp and clean for best performance.
- 4.1.9 Follow instructions in the user's manual for lubricating and changing accessories.
- 4.1.10 Be sure to keep good footing and maintain good balance when operating power tools.
- 4.1.11 Wear proper apparel for the task. Loose clothing, ties, or jewelry can become caught in moving parts.
- 4.1.12 Remove all damaged portable electric tools from use and tag them: "Do Not Use."

4.2 Guards

- 4.2.1 The exposed moving parts of power tools need to be safeguarded. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded.
- 4.2.2 Machine guards, as appropriate, must be provided to protect the operator and others from the following:
- Point of operation.
 - In-running nip points.
 - Rotating parts.
 - Flying chips and sparks.
 - Safety guards must never be removed when a tool is being used. 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. 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.

5.0 Operating Controls and Switches

- 5.1 The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released: drills; tappers; fastener drivers; horizontal, vertical, and angle grinders with wheels more than 2 inches (5.08 centimeters) in diameter; disc sanders with discs greater than

2 inches (5.08 centimeters); belt sanders; reciprocating saws; saber saws, scroll saws, and jigsaws with blade shanks greater than 1/4-inch (0.63 centimeters) wide; and other similar tools.

- 5.2 These tools also may be equipped with a “lock-on” control, if it allows the worker to also shut off the control in a single motion using the same finger or fingers.
- 5.3 The following hand-held power tools must be equipped with either a positive “on-off” control switch, a constant pressure switch, or a “lock-on” control:
 - 5.3.1 Disc sanders with discs 2 inches (5.08 centimeters) or less in diameter.
 - 5.3.2 Grinders with wheels 2 inches (5.08 centimeters) or less in diameter.
 - 5.3.3 Platen sanders, routers, planers, laminate trimmers, nibblers, shears, and scroll saws; and jigsaws, saber and scroll saws with blade shanks a nominal 1/4-inch (6.35 millimeters) or less in diameter.
 - 5.3.4 It is recommended that the constant-pressure control switch be regarded as the preferred device.
 - 5.3.5 Other hand-held power tools such as circular saws having a blade diameter greater than 2 inches (5.08 centimeters), chain saws, and percussion tools with no means of holding accessories securely must be equipped with a constant-pressure switch.

6.0 Electrical Shock Caution

- 6.1 Electrical shocks, which can lead to injuries such as heart failure and burns, are among the major hazards associated with electric powered tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death.
- 6.2 An electric shock also can cause the worker to fall off a ladder or other elevated work surface and be injured due to the fall.
- 6.3 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.
- 6.4 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.
- 6.5 The third prong must never be removed from the plug.
- 6.6 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.

7.0 Electric Tools General Practice

- 7.1 Operate electric tools within their design limitations.
- 7.2 Use gloves and appropriate safety footwear when using electric tools.
- 7.3 Store electric tools in a dry place when not in use.
- 7.4 Do not use electric tools in damp or wet locations unless they are approved for that purpose.
- 7.5 Keep work areas well lighted when operating electric tools. Ensure that cords from electric tools do not present a tripping hazard.
- 7.6 In the construction industry, employees who use electric tools must be protected by ground-fault circuit interrupters or an assured equipment-grounding conductor program.

8.0 Pneumatic Tools (powered by compressed air)

- 8.1 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.
- 8.2 Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected.
- 8.3 A short wire or positive locking device attaching the air hose to the tool must also be used and will serve as an added safeguard.
- 8.4 If an air hose is more than 1/2-inch (12.7 millimeters) 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.
- 8.5 In general, the same precautions should be taken with an air hose that are recommended for electric cords, because the hose is subject to the same kind of damage or accidental striking, and because it also presents tripping hazards.
- 8.6 When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation.
- 8.7 Pneumatic tools 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 special device to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.
- 8.8 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.

9.0 Liquid Fuel Tools (operated with gasoline)

- 9.1 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.
- 9.2 Before refilling a fuel-powered tool tank, the worker must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapors.
- 9.3 When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide.
- 9.4 Noise hazards associated with gasoline engines must be mitigated by proper hearing protection utilization. Ear plugs, ear muffs or a combination of the two must be used to protect workers from excessive noise levels.
- 9.5 Fire extinguishers must also be available in the area.

10.0 Hydraulic Power Tools (fluid run)

- 10.1 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.
- 10.2 The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.
- 10.3 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. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.

- 10.4 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.
- 10.5 To set up a jack, make certain of the following:
 - 10.5.1 The base of the jack rests on a firm, level surface;
 - 10.5.2 The jack is correctly centered;
 - 10.5.3 The jack head bears against a level surface; and
 - 10.5.4 The lift force is applied evenly.
- 10.6 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:
 - 10.6.1 For jacks used continuously or intermittently at one site—inspected at least once every 6 months;
 - 10.6.2 For jacks sent out of the shop for special work—inspected when sent out and inspected when returned; and
 - 10.6.3 For jacks subjected to abnormal loads or shock—inspected before use and immediately thereafter.

Highway and Road Work

1.0 Purpose and Scope

- 1.1 To address potential hazards that may occur during highway construction or during work within the right of way of a public or private roadway.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Personal Protective Equipment (PPE)** – Safety clothing and equipment worn by workers in traffic areas to provide protection and heightened visibility from physical hazards including moving vehicles and construction equipment.
- 2.2 **Traffic areas** – Any work area where workers are located within 20 feet of moving traffic, existing or anticipated.
- 2.3 **Traffic Protection Plan** – A detailed plan for the protection of workers in a work zone. The plan must contain a written description of the traffic hazards to which workers may be exposed and measures used to protect them meeting local legislation.
- 2.4 **Traffic Control Plan** – A detailed plan for the control of traffic during construction, maintenance, or utility operations on a highway/road, taking into account the organized, systematic, safe conduct of the project, including, as applicable, detours, staging sequences, work vehicle access and egress from work sites, temporary barriers, removal of old pavement markings and selection and planned implementation of appropriate typical layouts for traffic control. Plan must be written to meet local legislation.
- 2.5 **WOF** – Workers on foot.

3.0 References

- 3.1 [Learning Management System \(LMS\)](#)
- 3.2 S3NA-208-PR1 Personal Protective Equipment Program
- 3.3 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.4 Transportation Association of Canada, [Manual of Uniform Traffic Control Devices for Canada](#) (2014)
- 3.5 U.S. Department of Transportation – Federal Highway Administration (FHWA) – [Manual of Uniform Traffic Control Devices](#) (2009 edn. With revision number 1 and 2 incorporated, dated May 2012)

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Manager or Supervisor

- Responsible for administering the procedure and for determining the measures and configuration of the temporary traffic control zone in accordance with specifications for workers, motorists, and pedestrians, and the protection of AECOM employees.
- See that employees assigned to work in traffic areas are trained in the use of traffic control systems and Personal Protective Equipment (PPE).

4.1.2 Flag Person

- Stand in a safe position, be clearly visible, have an unobstructed view of approaching traffic, and be positioned at least 80 feet (25 meters) away from the work area unless circumstances

or space requirements, such as working at or near an intersection, dictate otherwise.

- Trained and competent and will use appropriate PPE.
- Instructed in traffic control and flagging procedures, will be provided with sufficient breaks, and will not be permitted to work alone for extended periods as per local legislation.
- Not to engage in conversation with motorists except to provide clear instructions and will stay alert at their points of duty until relieved.

4.1.3 Site Safety Officer

- Responsible to the **Project Manager/Supervisor** for the implementation of safety and the internal traffic protection and control plans within a highway/road worksite.
- Be responsible for traffic safety coordination on the specified project.
- Have training in the requirements of the governing transportation authority and the applicable Occupational Health and Safety legislation.
- Be involved in conducting hazard assessments, developing the mitigating strategies and Safe Job Procedures, and reviewing their implementation for any project where traffic is identified as a hazard to AECOM staff.

4.2 Training

4.2.1 **Employees** who have potential exposures to highway and road hazards shall be trained. Refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning* for specific required training assigned in the LMS.

4.2.2 All staff will receive on-site orientation to the hazards and controls.

4.2.3 Only staff with appropriate flag person (traffic control) training will act as a **flag person**.

4.2.4 **Flag persons** must be instructed on the specific project traffic control plan.

4.2.5 **Flag persons** must be trained/certified in signalling methods required by the authority in charge.

4.2.6 **WOF, equipment operators, and drivers** in internal work zones must know the routes that construction vehicles will use.

4.2.7 **Equipment operators** and **signal persons** must know the hand signals used on the worksite.

4.2.8 **Operators** and **WOF** must know the visibility limits and the "blind spots" for each vehicle on site.

4.2.9 **Workers** should be made aware of the ways in which hazards associated with shift work and night work may affect their performance.

4.3 PPE

4.3.1 PPE requirements shall be determined based on the task hazard analysis. Refer to the *S3NA-208-PR1 Personal Protective Equipment Program*.

- High visibility safety vest/apparel with retro-reflective stripes (American National Standards Institute/Canadian Standards Association [ANSI/CSA] Class II at minimum).
- Work conducted at night may require that the minimum level of apparel worn be, at minimum.
- ANSI/CSA Class III, as required by governing legislation.
- Protective headwear, foot wear, safety glasses and hearing protection.
- Two-way radio or other means of effective communication.

4.4 Traffic accommodation equipment, as required by the Traffic Protection Plan

The traffic accommodation equipment could entail:

- A rooftop beacon light for the vehicle, where required

- Pylons, Glo-posts, flags, barricades and/or flagging tape, warning lights, flashing light boards
- Signage
- Flagging equipment, as required:
 - Daytime:
 - Flag person's "Stop and Slow" paddle
 - PPE including high-visibility clothing meeting local legislation.
 - Drinking water
 - Bug repellent and/or sun screen as conditions warrant
 - Optional radio communication (if required)
 - Night time (additional requirements):
 - A retro-reflective "Stop and Slow" paddle
 - A flashlight fitted with a red signaling baton
 - Flashing yellow beacons set up in advance of the **flag person**
 - Additional night time PPE

4.5 Traffic Control Plan

4.5.1 Each **Project Manager** shall prepare a project Traffic Protection Plan addressing traffic controls and worker protection appropriate for the team's exposures. The Traffic Protection Plan may be a stand-alone document, or contained within the project Health and Safety Plan or Safe Work Plan if allowed by legislation. Plans shall address the following if applicable:

- Closure zones within the project boundaries
- Work zone protections: various styles of concrete, water, sand, collapsible barriers, crash cushions, and truck mounted attenuators
- Guide vehicles
- Communications
- Night operations work within traffic controls
- PPE
- Sanitation
- Traffic control plans and permits
- Training
- Worker and heavy mobile equipment interface

4.5.2 A Traffic Control Plan will be completed for the movement of vehicles in areas where workers are conducting other tasks.

4.5.3 **Drivers, WOF** and pedestrians will be able to see and understand the routes they are to follow.

4.5.4 Where there are several projects, coordinated vehicle routes and communication between contractors will reduce vehicular struck-by incidents.

4.5.5 Hazard identification and plan development shall be performed in accordance with this procedure. The plans shall include the identification of the responsibility for personnel and implementation of the safety program under highway construction activities.

4.5.6 Other requirements for supporting activities such as excavations, heavy equipment usage, personal protective equipment, etc. shall be applicable and addressed in accordance with other procedures.

- A traffic protection plan will be an integral part of the Health and Safety Plan or Safe Work Plan whenever staff will be exposed to the hazards of vehicular traffic during project work (this may include surveys, drilling and soils inspections, bridge or overpass inspections, inspection of roadway construction projects).
- Work duration, road width, and traffic volume are some of the key considerations to be contemplated when designing a Traffic Protection Plan. The Traffic Protection Plan will address the specific vehicular hazards and describe the measures that will be implemented to protect employees.
- Traffic Control and Protection Plan will be developed in consultation with a qualified supervisor or manager experienced in traffic control. In addition, a supervisor will be designated to oversee the implementation of the protection plan until work is completed.
- Occupational Health and Safety regulations and associated standards or guidebooks provide instruction on the use of traffic control devices in temporary construction, maintenance, and utility work zones for worker and motorist safety and to minimize the disruption of traffic flow.
- Schedule work to avoid periods of heavy traffic.
- Alert traffic of work ahead, by placing signs or cones well ahead of the work area.
- If the work area is being managed under a Traffic Control Plan or Traffic Protection Plan, obtain copies of these plans before commencing work.
- Traffic accommodation that is adequate in good weather conditions and daylight may not be adequate under adverse weather conditions and/or hours of darkness. Reassess the accommodation based on conditions.
- Traffic accommodation will be planned to provide safe conditions for the protection and safe passage of motorists, pedestrians, and employees at all work sites. It will include all areas located within the traveled portion of a roadway including shoulders, ditches, and boulevards.

4.6 Restrictions

- 4.6.1 Applicable legislated requirements governing all aspects of traffic safety, including directing traffic, signage, PPE, traffic control devices in temporary construction, maintenance and utility work zones, will be reviewed in preparation for the site-specific traffic control, protection or accommodation plan.
- 4.6.2 No personnel will be allowed onto the site without first reviewing the project-specific Traffic Protection Plan.

4.7 Short-Term Traffic Protection

- 4.7.1 Always wear the appropriate PPE to maintain your visibility to vehicular traffic. Wear a tear-away fluorescent reflective vest (and retro-reflective stripes on the arms and legs for night work or during periods of limited visibility) at all times.
- 4.7.2 Pull your vehicles off as far to the right of the travelled portion of the road as possible. Confirm that the shoulder of the highway or street where you will park your vehicle is wide enough to allow for safe access to and egress from the vehicle.
- 4.7.3 Always park your vehicle at least 100 feet (30 metres) from the flag person station. The vehicle should be positioned between the **flag person** and the work crew.
- 4.7.4 Activate the four-way flashers and rotating beacon (if required) for your vehicle prior to exiting the vehicle.
- 4.7.5 Plan an escape route prior to exiting the vehicle.
- 4.7.6 Load and unload materials or equipment from the passenger side of the vehicle.
- 4.7.7 Avoid turning your back to oncoming traffic.
- 4.7.8 Be aware of mobile equipment that may be operating in the work area.

- 4.7.9 Do not enter onto the travelled portion of the road except to cross the road. Road crossings should be made at a 90 degree angle to the direction of the road.
- 4.8 Long-Term Traffic Protection
- 4.8.1 Traffic accommodation will be provided BEFORE the work starts and will be maintained until the work is completed.
- 4.8.2 Generally, for long-term duration work activities that are performed at construction projects, the Constructor of the project is required to develop a Traffic Protection Plan.
- 4.8.3 If AECOM has assumed the role of Constructor for the project, the Traffic Protection Plan will be developed and implemented prior to the commencement of work activities at the project.
- 4.8.4 If AECOM is not the Constructor for the project, the traffic Protection Plan for the project will be developed by our Client or a Constructor designated by the Client.
- 4.8.5 The Traffic Protection Plan should be reviewed with AECOM employees during orientation to the project.
- 4.9 Signage
- 4.9.1 Standard highway signs for information, speed limits, and work zones will assist drivers in identifying designated traffic paths.
- 4.9.2 Provide appropriate instructional signage such as: EVACUATION ROUTE; DO NOT ENTER; REDUCED SPEED AHEAD; ROAD CLOSED; and NO OUTLET.
- 4.9.3 Using standard highway signs for internal construction worksite traffic control will assist workers in recognizing the route they are to use at the construction site.
- 4.9.4 Traffic Signs
- Signage will be of acceptable standards, in good condition, clean, legible, suited to the purpose, and meeting local legislation requirements
 - Signage will be secured or weighted.
 - Routinely inspect signage for placement, cleanliness, and physical damage.
 - Cover road traffic control signage when no activity is present.
- 4.10 Traffic Control Devices
- 4.10.1 Standard traffic control devices, signals, and message boards will instruct drivers to follow a path away from where work is being done.
- 4.10.2 The authority in charge will determine the approved traffic control devices such as cones, barrels, barricades, and delineator posts that will be used as part of the Traffic Control Plan.
- 4.11 Work Zone Protections
- 4.11.1 Various styles of concrete, water, sand, collapsible barriers, crash cushions, and truck-mounted attenuators shall be used to limit motorist intrusions into the construction work zone, as appropriate.
- 4.11.2 All AECOM staff shall be made aware of controls established by the Contractor.
- 4.11.3 AECOM staff shall wear the required safety equipment at all times.
- 4.11.4 In the absence of a contractor, when AECOM staff are in the field alone—e.g., investigations, surveys—all appropriate Department of Transportation traffic control standards and devices shall be observed and placed in position.
- 4.11.5 The work zone shall be made safe by its separation from traffic.

4.12 Flagging

- 4.12.1 **Flag persons** and others providing temporary traffic control will wear Class 2 or 3 high visibility retro-reflective clothing in compliance with local legislation.
- 4.12.2 Drivers should be warned in advance with signs that there will be a **flag person** ahead.
- 4.12.3 **Flag person** should use STOP/SLOW signs or paddles. The STOP sign should be octagonal with a red background and white letters and border. The SLOW sign should be octagonal with an orange background and black letters and a border.
- 4.12.4 "Flag Person Ahead" signs will be posted in advance of each flag person's station. Such signs will be removed promptly when the flagging operation terminates.

4.13 Lighting

- 4.13.1 Flag person stations should be illuminated. Lighting for workers on foot and equipment operators is to be at least 5 foot (1.5 meter) candles or greater.
- 4.13.2 Where available lighting is not sufficient, flares or chemical lighting should be used.
- 4.13.3 Glare affecting workers and motorists should be controlled or eliminated.

4.14 Driving

- 4.14.1 Seatbelts and rollover protection will be used on equipment and vehicles as stated by the manufacturer.
- 4.14.2 When pulling off to the side of the road, AECOM personnel will park their vehicles at minimum of 20 feet (6 meters) or the width of two traffic lanes from moving traffic.

4.15 Night Operations and Work within Traffic Controls

- 4.15.1 Night work on roadways should not be done unless absolutely necessary and unless the work area is adequately lit.
- 4.15.2 Operations with night activities will have a written plan that addresses the safety issues of working at night. The plan will address, but is not limited to:
 - Reflectivity
 - All equipment used in the work zone shall have ANSI/CSA approved reflective material placed to increase the visibility of the equipment.
 - All reflective surfaces shall be cleaned as required so that the reflectivity of the material is not degraded. Any areas of reflective surface that is damaged or obscured will be replaced.
 - Personnel working at night will have reflective tape on their hardhats and will wear retro-reflective vests and each limb that meet the legislative requirements.
 - Additional measures such as white disposable coveralls, reflective bands, flashlights with red cones and personal battery-operated strobe lights may be used when practical.
 - Illumination
 - Whenever feasible and practical, light plants will be used to illuminate the work area.
 - On mobile operations, additional lighting on equipment may be used to illuminate the work area.
 - All equipment shall have working lights and at a minimum, have working strobe or warning beacon lights.
 - All flag persons will be placed in illuminated areas only.

- All lighting is to be checked after setup to confirm that it is not interfering with approaching traffic, other equipment in the work zone, and meets the legislative Occupational Health and Safety requirements.
- Task Hazard Analysis and Communication
 - Prior to the start of any night operation, a detailed task hazard analysis will be made addressing the possible hazards of night work. Refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning*. The task hazard analysis will be reviewed with the crews and updated as needed. At the start of each shift, a Daily Safety Reminder will be used to reaffirm the provisions of the night work requirements as found in the task hazard analysis and this policy.
 - The task hazard analysis should also provide for:
 - The selection of a competent person responsible for maintaining surveillance on the work area to alert other workers of vehicles encroaching on the work zone.
 - A method to signal workers when vehicles encroach on the work zone.
 - A system to account for workers at all times, which may include a buddy system.
 - Emergency communication or warning signals used by a worker such as a radio, signal horn, or whistle, which will be used to call for help.

4.16 Attenuator Vehicles

- 4.16.1 It is good construction practice to place an attenuator truck or pick-up truck (minimum) immediately ahead of workers in a work zone.
- 4.16.2 The vehicle of choice should be placed to provide the best protection for workers.
- 4.16.3 The tires should be placed so that when struck the vehicle will turn away from workers.

4.17 Closures within a Closure

- 4.17.1 On occasion, satellite operations may be performed under full freeway traffic closures. For this type of work, special precautions referred to as a "closure within a closure" is to be implemented in accordance with the following:
 - Posted speed limits within closures should be set at 15 miles (24 kilometers) per hour.
 - Signs are to be installed approximately 250 feet (76 meters) in advance of and behind the work zone to alert drivers who may approach from either direction of the upcoming work zone.
 - The work area is to be completely delineated with Type 1 barricades (candlesticks).
 - Any vehicle used for AECOM field work shall be equipped with a functioning four way flashers and rotating beacon placed on the roof of the vehicle.

5.0 Records

- 5.1 Traffic Protection Plans, Traffic Control Plans and completed Equipment Checklists will be maintained in project files.

6.0 Attachments

- 6.1 S3NA-306-FM1 Equipment Checklist

Americas

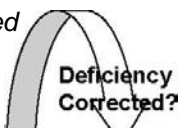
Equipment Checklist

S3NA-306-FM1

Name of Contractor: _____ Project Name: _____
 Location: _____ Project #: _____
 Date: _____ Time: _____ Weather: _____
 Person Conducting Inspection _____ Title: _____

*Note: As you conduct your inspection you should be able to answer each question with a **YES**. If the answer to any question is **NO**, this deficiency should be corrected as soon as possible.*

	YES	NO	OK	N/A
Are accident prevention signs, tags clearly visible?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are danger signs used where immediate hazards exist?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are caution signs used to warn against potential hazards or to caution against unsafe practices?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are exit signs posted at all exit locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are proper visual warning signs posted prior to (in advance of) the work area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are flaggers provided with signs, signals, and barricades to provide the necessary protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are flaggers using red lights when signaling during periods of darkness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are flaggers wearing highly visible warning garments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the flaggers trained in proper flagging procedures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are warning garments worn at night reflectorized?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are highly visible flags used by the flaggers at least 18 inches (45 centimeters) square?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are barricades used to totally obstruct the passage of people and vehicles to protect the work area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do barricades meet the requirements set forth in the Manual of Uniform Traffic Control Devices?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



COMMENTS:

Housekeeping, Worksite

1.0 Purpose and Scope

- 1.1 This procedure provides AECOM's work practices as well as personal hygiene and work site sanitation standards for housekeeping.
- 1.2 Applies to all AECOM Americas-based staff and field worksites.

2.0 Terms and Definitions

- 2.1 None

3.0 References

- 3.1 S3NA-103-PR1 Housekeeping, Office
- 3.2 S3NA-208-PR1 Personal Protective Equipment Program

4.0 Procedure

- 4.1 Roles and Responsibilities
- 4.1.1 **Supervisor (or Project Manager)**
Responsible for the procedure's implementation and the details of addressing housekeeping policy within the worksite.
- 4.1.2 **SH&E Department**
Monitor, assess, and report on project housekeeping when visiting worksites.
- 4.1.3 **Employees**
Responsible for reporting any areas of concern to the **Supervisor** for prompt resolution as well as for maintaining worksites that are free from debris, clutter, and slipping or tripping hazards.
- 4.2 Smoking, Eating, and Drinking
- 4.2.1 Eating and drinking will be permitted in designated areas at AECOM project sites and as specified on client sites.
- 4.2.2 Smoking will be permitted only in areas:
- designated in compliance with applicable local laws, regulations, legislation, and ordinances, by the Supervisor
 - situated in locations that are not in the immediate vicinity of activities associated with work site activities
 - Free of fire hazard
 - That will not contaminate indoor areas and HVAC systems. Specifically, there shall be no smoking within 16 feet (5 meters) around doorways, windows, air vents, and HVAC intakes and equipment.
- Additionally, **Supervisors** will designate each smoking area giving primary consideration to those employees who do not smoke.
- 4.2.3 **Employees** involved in the performance of certain activities will not be permitted to smoke, eat, drink, or use smokeless tobacco, except during breaks (e.g., HAZWOPER-controlled work areas).

4.2.4 Site **employees** will first wash hands and face after completing work activities and prior to eating or drinking.

4.3 Water Supply

Water supplies will be available for use on site and will comply with the following requirements:

- Potable Water: An adequate supply of drinking water will be available for site staff consumption. Potable water can be provided in the form of approved well or city water, bottled water, or drinking fountains. Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from nonpotable water sources.
- Nonpotable Water: Nonpotable water will not be used for drinking purposes. Nonpotable water may not be used for hand washing or other personal hygiene activities but may be used for other types of cleaning activities. All containers/supplies of nonpotable water used will be properly identified and labeled as such.

4.4 Toilet Facilities

4.4.1 Toilet facilities will be available for site staff and visitors. Should subcontractor staff be located on-site for extended periods, it may become necessary to obtain temporary toilet facilities. Exceptions to this requirement will apply to mobile crews where work activities and locations permit transportation to nearby toilet facilities.

4.4.2 A minimum of one toilet will be provided for every 20 site staff, with separate toilets maintained for each sex, except where there are less than five total staff on site. For mobile crews where work activities and locations permit use of nearby toilet facilities (e.g., gas station, or rest stop), on-site facilities are not required.

4.5 Washing Facilities

4.5.1 Hand and Face: Site staff will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.

4.5.2 Personal Cleaning Supplies: Cleaning supplies at AECOM project sites will consist of soap, water, and disposable paper towels or items of equal use/application (e.g., anti-bacterial gels, wipes, etc.).

4.6 Clothing and Personal Protective Equipment (PPE)

4.6.1 All PPE will be kept clean at all times and maintained in accordance with the manufacturer's, AECOM's, and applicable regulatory, legislative, or provincial requirements. Refer to the *S3NA--208-PR1 Personal Protective Equipment Program*.

4.6.2 General Work Areas - At all times work areas will be kept free of dirt and debris that may impact the safety of site staff and visitors. All trash receptacles will be emptied regularly.

4.6.3 Break Areas and Lunchrooms - Site staff will observe the following requirements when using break areas and lunchrooms at AECOM project sites:

4.6.4 All food and drink items will be properly stored when not in use.

4.6.5 Food items will not be stored in personal lockers for extended periods in order to prevent the potential for vermin infestation.

4.6.6 Perishable foods will be refrigerated whenever possible.

4.6.7 All waste food containers will be discarded in trash receptacles.

4.6.8 All tables, chairs, counters, sinks, and similar surfaces will be kept clean and free of dirt, waste food, and food containers at all times.

4.6.9 Refrigerators used to store food items will be maintained at 45 degrees Fahrenheit and emptied of all unclaimed food items weekly. Refrigerators used to store food will be labeled as such so that only food and drinks are stored within the refrigerator.

4.6.10 Routine cleaning of refrigerators will also be performed on a regular basis.

4.7 Vermin Control

4.7.1 Every enclosed workplace shall be constructed, equipped, and maintained, so far as reasonably practicable, to prevent the entrance or harborage of rodents, insects, and other vermin.

4.7.2 A continuing and effective extermination program shall be instituted where the presence of rodents, insects, or other vermin is detected.

4.8 General Housekeeping

4.8.1 All work areas shall be kept clean to the extent that the nature of the work allows.

4.8.2 Every work area shall be maintained, so far as practicable, in a dry condition. Where wet processes are used, drainage shall be maintained and platforms, mats, or other dry standing places shall be provided, where practicable, or appropriate waterproof footwear shall be provided.

4.8.3 Protruding objects or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Employees will use a reasonable amount of effort to keep slip, trip, and fall hazards to a minimum.

4.8.4 Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal.

4.8.5 At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.8.6 Material and equipment must be placed, stacked, or stored in a stable and secure manner. Stacked material or containers must be stabilized as necessary by interlocking, strapping, or other effective means of restraint to protect the safety of workers.

4.8.7 An area in which material may be dropped, dumped, or spilled must be guarded to prevent inadvertent entry by workers or protected by adequate covers and guarding.

4.8.8 Floors, platforms, ramps, stairs, and walkways available for use by workers must be maintained in a state of good repair and kept free of slipping and tripping hazards. If such areas are taken out of service, the employer must take reasonable means for preventing entry or use.

4.8.9 Site ice / snow conditions shall be assessed prior to the start of work each day and controls for removal of ice or slip risk mitigation shall be implemented as necessary.

4.8.10 Hazardous areas not intended to be accessible to workers must be secured by locked doors or equivalent means of security and must not be entered unless safe work procedures are developed and followed.

4.8.11 Worksite Offices and Trailers - Worksite offices and trailers will be maintained in accordance with *S3NA-103-PR1 Housekeeping, Office*.

5.0 Records

5.1 None

6.0 Attachments

6.1 None

Manual Lifting, Field

1.0 Purpose and Scope

- 1.1 This procedure provides the requirements for use when performing manual materials handling activities (e.g., lifting/handling of items or materials).
- 1.2 This procedure applies to all field staff for AECOM Americas-based operations.

2.0 Terms and Definitions

- 2.1 **Manual Materials Handling** – Moving or handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining.
- 2.2 **Team Handling** – Team handling occurs when more than one person is involved during the lift.

3.0 References

- 3.1 [OSHA Technical Manual](#)
- 3.2 [National Safety Council](#)
- 3.3 [Canadian Centre for Occupational Health and Safety](#)

4.0 Procedure

- 4.1 Roles and Responsibilities
 - 4.1.1 **Project Manager**

Responsible for administering the procedure and providing resources and direction on proper lifting/handling techniques.
 - 4.1.2 **District SH&E Manager**

Assist in identifying activities with a high potential for lifting/handling strains/injuries as well as the associated mitigation strategies and training on proper lifting/manual materials handling techniques.
 - 4.1.3 **Employees**

Responsible for reviewing and following *S3NA-308-W11 Manual Lifting Safe Work Practices*.
- 4.2 Mechanical Controls
 - 4.2.1 Mechanical equipment or assistance such as dollies, carts, come-alongs, or rollers are preferable to be used whenever possible rather than the employee physically moving materials.
 - 4.2.2 Mechanical assistance will be of proper size, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on wrists.
 - 4.2.3 Objects to be moved will be secured to prevent falling and properly balanced to prevent tipping.
- 4.3 Administrative Controls
 - 4.4 When significant, sustained lifting work is required, it is desirable to rotate **employees** to spread the work load among several people and thereby avoid fatigue.
 - 4.5 Rotation is not simply performing a different job but instead is performing a job that utilizes a completely different muscle group from the ones that have been overexerted.
 - 4.6 All **employees** exposed to manual handling hazards shall be trained on safe lifting and handling of loads.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-308-W11 Manual Lifting Safe Work Practices

Manual Lifting Safe Work Practices

1.0 General

1.1 Before Performing a Lift:

- 1.1.1 Check to see if mechanical aids such as hoists, lift trucks/dollies, or wheelbarrows are available.
- 1.1.2 Do not lift if you are not sure that you can handle the load safely.
- 1.1.3 Confirm that, based on your own physical capabilities and medical limitations, you can lift the load without overexertion. Get help with heavy or awkward loads.
- 1.1.4 Confirm that the load is “free” to move.
- 1.1.5 Check that the planned destination of the load is free of obstacles and debris.
- 1.1.6 Confirm that the path to the planned destination of the load is clear. Grease, oil, water, litter, and debris can cause slips and falls.
- 1.1.7 Particular handling and lifting techniques are needed for different kinds of loads or materials being handled (for example, compact loads, small bags, large sacks, drums, barrels, cylinders, and sheet materials like metal or glass). See Section 2.0 for additional guidance.

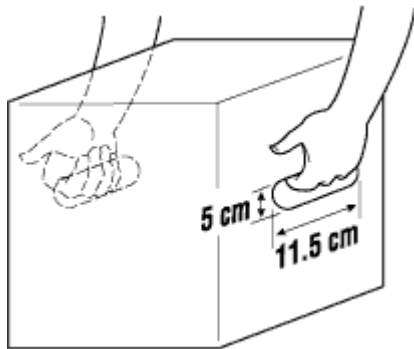
1.2 General Tips for Lifting

- 1.2.1 Prepare for the lift by warming up your muscles.
- 1.2.2 Make certain that your balance is good. Feet should be shoulder width apart, with one foot beside and the other foot behind the object that is to be lifted.
- 1.2.3 Bend the knees; do not stoop. Keep the back straight, but not vertical. There is a difference. Tucking in the chin straightens the back.
- 1.2.4 Grip the load with the palms of your hands and your fingers. The palm grip is much more secure. Tuck in the chin again to make certain your back is straight before starting to lift.
- 1.2.5 Use your body weight to start the load moving, then lift by pushing up with the legs. This makes full use of the strongest set of muscles.
- 1.2.6 Keep the arms and elbows close to the body while lifting.
- 1.2.7 Carry the load close to the body. Do not twist your body while carrying the load. To change direction, shift your foot position and turn your whole body.
- 1.2.8 Watch where you are going!
- 1.2.9 To lower the object, bend the knees. Do not stoop. To deposit the load on a bench or shelf, place it on the edge and push it into position. Confirm that your hands and feet are clear when placing the load.

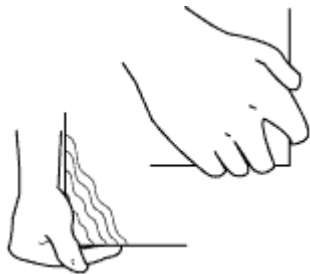
1.3 Engineering Controls

- 1.3.1 Material handling tasks should be designed to minimize the weight, range of motion, and frequency of the activity.
- 1.3.2 Alter the task to eliminate the hazardous motion and/or change the position of the object in relation to the employee's body—such as adjusting the height of a pallet or shelf.
- 1.3.3 Work methods and stations should be designed to minimize the distance between the person and the object being handled.

- 1.3.4 High-strength push-pull requirements are undesirable, but pushing is better than pulling. Material handling equipment should be easy to move, with handles that can be easily grasped in an upright posture.
 - 1.3.5 Workbench or workstation configurations can force people to bend over. Corrections should emphasize adjustments necessary for the employee to remain in a relaxed upright stance or fully supported seated posture. Bending the upper body and spine to reach into a bin or container is highly undesirable. The bins should be elevated, tilted, or equipped with collapsible sides to improve access.
 - 1.3.6 Repetitive or sustained twisting, stretching, or leaning to one side are undesirable. Corrections could include repositioning bins and moving employees closer to parts and conveyors.
 - 1.3.7 Store heavy objects at waist level.
- 1.4 Whenever possible, utilize hand holds or other lifting attachments on objects being handled.



- 1.4.1 Use the “hook grip” on loads with cut-out handholds.
- 1.4.2 Curl your fingers around the edge.
- 1.4.3 Do not hold the load with your fingertips.
- 1.4.4 Use containers with handles located more than halfway up the side of the container.
- 1.4.5 Use the “ledge grip” to handle regularly shaped objects without handles.



- 1.4.6 Use vacuum lifters to handle sheet materials or plates.
- 1.4.7 Hold the object with hands placed diagonally.
- 1.4.8 Wear gloves where practical.

2.0 Specific Handling Techniques

The following guidance will be used when performing manual materials handling of various types.

- 2.1 Square or Rectangular Objects
 - 2.1.1 Place one foot slightly in front of the other.

- 2.1.2 Squat as close to the object as possible.
 - 2.1.3 Grasp one of the top corners away from the body and the opposite bottom corner closest to the body.
 - 2.1.4 Tilt the object slightly away from the body, tilt forward at the hips, keep the back straight, and tuck in the chin.
 - 2.1.5 Test to confirm that the object is loose from floor and will lift without snagging.
 - 2.1.6 Straighten the legs, keeping the backbone straight, pull the object into the body, and stand up slowly and evenly without jerking or twisting.
 - 2.1.7 If turning or change of direction is required, turn with feet without twisting the torso and step in the direction of travel.
 - 2.1.8 To set an object down, reverse the sequence, being sure not to trap the bottom hand between the object and the surface on which the object is set.
- 2.2 Cylindrical Objects
- 2.2.1 When lifting/moving round or cylindrical objects, the objects should be rolled wherever possible. Rolling must be controlled by chute, tagline, or other means of limiting acceleration. Workers must not be positioned downhill from rolled objects. Use of the legs for pushing and tagline control of rolled objects must be stressed.
 - 2.2.2 Cylindrical objects, such as drums that must remain upright, are to be handled manually by slightly tilting the object, using the legs for control, and balancing the object on the bottom edge. The handler then walks besides the object, with the object tilted toward the body, positioning the hands on the top edge away from the body and moving so they do not cross, thus maintaining balance and a steady, controlled, forward motion. Motion must be controlled so that ceasing to walk and moving the hands will stop forward motion.
 - 2.2.3 **Use carts or tracks to transport cylinders. Make sure that two people transport a cylinder if carts cannot be used, use lifting straps to improve grip.** Technique for one person lifting a cylinder onto a platform:
 - Roll the cylinder to within 3 feet (1 meter) of the platform.
 - Position the forward foot around the cylinder, the back foot about 1 foot (30 centimeters) behind the cylinder.
 - Bend knees slightly.
 - Place one hand on the valve protective cap, the other hand underneath the cylinder about 1 foot (30 centimeter) from the ground.
 - Tilt the cylinder onto the thigh of the back leg.
 - Balance the cylinder on the thigh by pressing down with the back hand while lifting the cylinder with the forward hand.
 - Extend both knees to initiate forward movement of the cylinder and continue by pushing up and forward with the arms until the cylinder is located on the platform.
 - Climb on the platform.
 - Straddle the cylinder at the valve end.
 - Grasp the valve protective cap of the cylinder with both hands between the thighs.
 - Lean forward and straighten the knees to set the cylinder upright.
- 2.3 Bags and Sacks
- 2.3.1 The best way to handle a bag depends on its size, weight, and how far it is to be carried. When lifting, remember to:

- Straddle the end of the bag.
- Bend the hips and knees.
- Keep the back straight.
- Grasp the bag with both hands under the closer end. Keep elbows inside the thighs.
- Lean forward, straightening the knees to set the bag upright.
- Readjust the straddle position moving feet closer to the bag.
- Readjust the grasp, with one hand clasping the bag against the body and the other under it.
- Stand up by thrusting off with the back leg and continuing in an upward and forward direction.
- Thrust the bag up with the knee while straightening the body.
- Put the bag on the shoulder opposite the knee used to thrust the bag up.
- Stabilize the bag on the shoulder.
- Move off without bending sideways.

2.3.2 Avoid unloading a bag from the shoulder directly to floor level. Use an intermediate platform or get help from a co-worker, remember to:

- Stand close to the platform.
- Place one foot in front of the platform.
- Bend hips and knees.
- Keep the back straight.
- Ease the bag off the shoulder and put it upright on the platform.
- Pull the bag slightly over the edge of the platform.
- Stand close to the platform with the bag touching the chest.
- Clasp the bag against the body with one hand, the other hand holding bottom of the bag.
- Step back.
- Bend hips and knees, keeping back straight.
- Ease the bag onto the floor.

2.3.3 Bulkier sacks are easier to carry on your back. Lift the sack onto your back from a platform:

- Move the sack to the edge of the platform.
- Put your back against the sack.
- Grasp with both hands on the upper corners of the sack.
- Ease the sack onto the back, bending hips and knees before taking the weight.
- Keep the back straight.
- Stand up and straighten the hips and knees.
- Stabilize the sack.
- Move away without bending sideways.

2.3.4 Two-person handling of a sack:

- Position one person on either side of the sack.
- Squat with one foot balancing behind the sack.

- Keep back straight.
- Grasp with the outer hand on the upper corner, the other hand holding the bottom of the sack.
- On one person's command:
 - Stand up and straighten the hips and knees.
 - Move toward the stack.
 - Put the sack on the stack.

2.4 Sheet Materials

2.4.1 When lifting sheet materials:

- Stand close to the pile of sheets in a walking stance.
- Grasp sheet firmly at the midpoint of its long side with the closer hand.
- Pull sheet up and toward the body.
- Change grip using your other hand and put your fingers on top of the sheet.
- Pull sheet up to the vertical position and to the side until one half is off the pile.
- Grasp the lower edge of the sheet with the free hand and support the hand by placing it on your knee.
- Stand up without bending or twisting body.
- Whenever moving sheet materials, be cognizant of wind conditions.

2.4.2 To carry sheets:

- Use drywall carts to carry sheet materials.
- Get help from another person where carts are not available.
- Apply carrying handles for manual carrying.
- Always use gloves and carrying handle for glass and other materials with sharp edges.

2.4.3 Use team lifting and carrying where other solutions are inappropriate.

- Remember that the combined strength of the team is less than the sum of individual strength.
- Select team members of similar height and strength.
- Assign a leader to the team.
- Determine a set of commands to be used such as "lift," "walk," "stop," and "down." Make sure that everyone knows what to do when they hear the command.
- Follow the commands given by the team leader.
- Practice team lifting and carrying together before attempting the task.

2.5 Material Storage

2.5.1 When storing materials on site:

- Store materials at a convenient height.
- Leave the lowest shelf unused if necessary.
- Use vertically mobile shelves to avoid bending and overhead reaching.
- Use bin racks for storing small items.
- Store heavy and frequently used materials at waist height.
- Do not store materials at floor level.

- Use hand trucks with elevating devices in storage and loading areas.
- Use trucks with a tilting device to avoid bending.
- Use elevating platforms to avoid overhead reaching.

Mobile or Heavy Equipment

1.0 Purpose and Scope

- 1.1 Outline the safe working requirements for working with and near mobile or heavy equipment and heavy equipment operation.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Heavy equipment** – All excavating equipment include scrapers, loaders, crawler or wheel tractors, excavators, backhoes, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment.
- 2.2 **Operator** – Any person who operates the controls while the heavy equipment is in motion or the engine is running.
- 2.3 **Ground personnel/workers** – Personnel performing work on the ground around heavy equipment (note: operators are considered ground personnel when outside of the equipment cab).

3.0 References

- 3.1 S3NA-202-PR1 Competent Person Designation
- 3.2 S3NA-205-PR1 Equipment Inspections & Maintenance
- 3.3 S3NA-406-PR1 Electrical Lines, Overhead

4.0 Procedure

- 4.1 Roles and Responsibilities
 - 4.1.1 **Project Managers/Site Supervisor**

Responsible for ensuring all equipment is in good working order and all equipment operators are qualified on the piece of machinery they are assigned. Ensure that subcontractor machinery and mechanized equipment is certified in accordance with the requirements of *S3NA-309-FM1 Certification of Machinery and Mechanized Equipment*.
 - 4.1.2 **Employees**

Confirm that all rented equipment arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
 - 4.1.3 **Operators** (of mobile equipment)

Operate the equipment safely, maintain full control of the equipment, and comply with the laws governing the operation of the equipment. Immediately report defects and conditions affecting the safe operation of the equipment to the site Supervisor.
- 4.2 Communication
 - 4.2.1 Communication between site supervisors/managers, heavy equipment operators, and other site personnel is a key method of preventing serious injury or death during heavy equipment operations.
 - 4.2.2 The following points outline the communication requirements during heavy equipment operations:
 - **Site Supervisors/Project Managers** shall confirm that all operators are notified/informed of when, where, and how many ground personnel will be working on site.

- **Site Supervisors/ Project Managers** shall inform all ground personnel before changes are made in the locations of designated work areas.
- Prior to work initiating on site, the **Site Supervisor/Project Manager** is to confirm all operators and ground personnel are trained on the hand signals that will be used to communicate between operators and ground personnel.
- **Ground Personnel** working around heavy equipment operations are to maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.
- All heavy equipment whose backup view can be obstructed shall be equipped with reverse warning devices (i.e., backup alarms) that can be significantly heard over equipment and other background noise. Reverse signaling lights shall be in working order.
- When feasible, two-way radios shall be used to verify the location of nearby ground personnel.
- When an operator cannot adequately survey the working or traveling zone, a **signal person** shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

4.3 Ground Personnel

4.3.1 Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations.

4.3.2 The following points outline the clearance requirements during heavy equipment operations:

- **Ground Personnel** shall always yield to heavy equipment.
- **Ground Personnel** shall maintain a suitable "buffer" area of clearance from all active heavy equipment.
- A job-specific hazard analysis that identifies any special precautions shall be completed and communicated to all AECOM personnel.
- **Site Supervisors/Project Managers** shall designate areas of heavy equipment operation and confirm that all ground personnel are aware of designated areas. Designated areas shall include boundaries and travel routes for heavy equipment. Travel routes shall be set up to reduce crossing of heavy equipment paths and to keep heavy equipment away from ground personnel.
- When feasible, **Site Supervisors/Project Managers** shall set up physical barriers (e.g., caution tape, orange cones, concrete jersey barriers) around designated areas and confirm that unauthorized ground personnel do not enter such areas.
- **Operators** shall stop work whenever unauthorized personnel or equipment enter the designated area and only resume when the area has been cleared.
- **Operators** shall only move equipment when aware of the location of all workers and when the travel path is clear.
- **Ground Personnel** shall never stand between two pieces of heavy equipment or other objects (i.e., steel support beams, trees, buildings, etc.).
- **Ground Personnel** shall never stand directly below heavy equipment located on higher ground.
- If working near heavy equipment, **Ground Personnel** shall stay out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
- **Ground Personnel** shall never work near heavy equipment.
- **Employees** shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.
- **Employees** shall not talk on a cell phone while standing or walking on a roadway or other mobile equipment path.

- 4.3.3 At a minimum, all **Ground Personnel** and **Operators** outside of heavy equipment shall wear the following:
- High visibility, reflective (Class 2) safety vest that is visible from all angles and made of fluorescent material and orange, white, or yellow reflective material (confirm that vest is not faded or covered with outer garments, dirt, etc.)
 - Retro-reflective striping for arms and legs (night work)
 - American National Standards Institute/Canadian Standards Association- (ANSI/CSA-) approved hard hat
 - ANSI/CSA-approved safety glasses with side shields
 - ANSI/CSA-approved work boots (unless project requirements are more stringent)
 - ANSI/CSA-approved hearing protection as needed
 - Appropriate work clothes (i.e., full-length jeans/trousers and a sleeved shirt; no tank, crew tops or other loose clothing permitted).
- 4.4 Prior to work commencing
- 4.4.1 All mobile equipment will be inspected pre-shift and then regularly as required with the details of the inspection recorded in a log book.
- 4.4.2 The **Operator** will report defects and conditions affecting the safe operation of the equipment to the Site Supervisor or employer. Any repair or adjustment necessary for the safe operation of the equipment will be made before the equipment is used.
- 4.4.3 Exposed moving parts on mobile equipment which are a hazard to the operator or to other workers will be guarded and if a part will be exposed for proper function it will be guarded as much as is practicable consistent with the intended function of the component.
- 4.4.4 An approved 4A40BC fire extinguisher shall be present on all mobile equipment.
- 4.4.5 Inform the operators of the equipment that AECOM employees are in the area and inquire if there are any restricted areas or specific rules or requirements. In some industrial facilities, mobile equipment has the 'right of way'.
- 4.4.6 Where the **Operator** will not have a full view of the path of travel, a signal person will be used on the ground that has a full view of the load, the operator, and the path.
- 4.4.7 Mobile equipment in which the operator cannot directly or by mirror or other effective device see immediately behind the machine will have an automatic audible warning device which activates whenever the equipment controls are positioned to move the equipment in reverse, and if practicable, is audible above the ambient noise level.
- 4.5 Operation
- 4.5.1 The **Operator** of mobile equipment is the only worker permitted to ride the equipment unless the equipment is a worker transportation vehicle.
- 4.5.2 A person will not operate mobile equipment unless the person has received adequate instruction and training in the safe use of the equipment, and has demonstrated to a qualified supervisor or instructor competency in operating the equipment.
- 4.5.3 The **Operator** of mobile equipment will operate the equipment safely, maintain full control of the equipment, and comply with the laws governing the operation of the equipment.
- 4.5.4 A site **Supervisor** will not knowingly operate or permit a worker to operate mobile equipment which is, or could create, an undue hazard to the health or safety of any person.
- 4.5.5 The **Operator** of mobile equipment will not leave the controls unattended unless the equipment has been secured against inadvertent movement such as by setting the parking brake, placing the transmission in the manufacturer's specified park position, and by chocking wheels where necessary.

- 4.5.6 The **Operator** will maintain the cab, floor and deck of mobile equipment free of material, tools or other objects which could create a tripping hazard, interfere with the operation of controls, or be a hazard to the operator or other occupants in the event of an accident.
- 4.5.7 If mobile equipment has seat belts required by law or manufacturer's specifications, the **Operator** and passengers will use the belts whenever the equipment is in motion, or engaged in an operation which could cause the equipment to become unstable.
- 4.5.8 When approaching or crossing the intended path of travel of mobile equipment, **Field Staff** shall establish eye contact with the operator of the mobile equipment and confirm that it is safe to proceed.
- 4.5.9 Have vehicle headlights on at all times when driving in the area.
- 4.5.10 Park motor vehicles off the haul roads, or away from the work areas.
- 4.5.11 Do not wear loose clothing or jewelry where there is a danger of entanglement in rotating equipment.
- 4.5.12 Do not enter the swing area of machines such as cranes, mobile drill rigs, or excavators, without first making eye contact with the operator, and receiving permission to do so.
- 4.5.13 Stay out of the blind areas around mobile equipment and never assume that the equipment operators have seen you or are aware of your presence.
- 4.5.14 Maintain a distance of 2 feet (60 centimeters) between the counterweight of swing machines and the nearest obstacle. If this distance cannot be maintained, the area will be barricaded or guarded to prevent access.
- 4.5.15 Vibration from moving traffic or mobile equipment can cause excavations or spoil piles to become unstable. Be aware of the risk and keep clear.
- 4.5.16 All heavy equipment shall be operated in a safe manner that will not endanger persons or property. When operating an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating, refer to the *S3NA-309-W11 Brokk 180 Safety Card* for more specifics.
- 4.5.17 All heavy equipment shall be operated at safe speeds.
- 4.5.18 Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.
- 4.5.19 Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.
- 4.5.20 When feasible, **Operators** shall travel with the "load trailing", if the load obstructs the forward view of the operator.
- 4.5.21 Slow down and sound horn when approaching a blind curve or intersection. Signal people equipped with 2-way radio communications may be required to adequately control traffic.
- 4.5.22 **Operators** shall remain in cab while heavy equipment is being loaded.
- 4.5.23 Equipment shall be shut down prior to and during fueling. Do not smoke or use electrical devices while fueling. Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.
- 4.5.24 Turn off heavy equipment, place gear in neutral and set parking brake prior to leaving vehicle unattended. Buckets and blades are to be placed on the ground and with hydraulic gears in neutral. Heavy equipment parked on slopes shall have the wheels chocked.
- 4.5.25 Never jump on to or off of a piece of heavy equipment, always maintain 3-points of contact at a minimum.
- 4.5.26 Never exit heavy equipment while it is in motion.

- 4.5.27 Passengers shall only ride in heavy equipment designed for occupancy of passengers.
 - 4.5.28 Never ride on the outside of a piece of heavy equipment (e.g., tailgates, buckets, steps, etc.).
 - 4.5.29 Site vehicles will be parked in a designated parking location away from heavy equipment.
 - 4.5.30 **Operators** shall never push/pull “stuck” or “broken-down” equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.
 - 4.5.31 If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.
 - 4.5.32 Equipment left unattended at night adjacent to traveled roadways shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of that equipment, and shall not be closer than 6 feet (or the regulatory requirement for the work location) to the active roadway.
 - 4.5.33 Pneumatic-tired earthmoving haulage equipment, with a maximum speed exceeding 15 miles per hour, shall be equipped with fenders on all wheels.
 - 4.5.34 Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not to be exceeded.
 - 4.5.35 Steering or spinner knobs shall not be attached to steering wheels.
 - 4.5.36 High-lift rider industrial trucks shall be equipped with overhead guards.
 - 4.5.37 When ascending or descending grades in excess of 5 percent, loaded trucks shall be driven with the load upgrade.
 - 4.5.38 All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded when exposed to contact by persons or when they otherwise create a hazard.
 - 4.5.39 All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.
 - 4.5.40 All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.
 - 4.5.41 Platforms, foot walks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.
 - 4.5.42 Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.
- 4.6 Utilities
- 4.6.1 When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc. Refer to the *S3NA-406-PR1 Electrical Lines, Overhead* procedure for more specifics.
 - 4.6.2 The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:
 - Always be aware of surrounding utilities.
 - Confirm all equipment (i.e., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath of aboveground utilities.
 - Confirm utilities are cleared and identified prior to beginning any earthmoving operation. Contact the local utility service providers for clearance prior to performing work. Confirm documentation of the contact is made; date, number; contact name, organization, etc.

4.7 Training

- 4.7.1 The **Operator** or other qualified supervisor will provide all on-site personnel with an orientation to the mobile equipment and its associated hazards and controls.
- 4.7.2 Only designated, qualified personnel shall operate heavy equipment.
- 4.7.3 **Operators** shall have all appropriate local, State, or Federal licenses or training to operate a designated piece of heavy equipment.
- 4.7.4 **Operators** shall be evaluated through documented experience and routine monitoring of activities unless the equipment is operated by an AECOM operator in which case a practical evaluation is needed. **Operators** shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

4.8 Inspection and Maintenance

- 4.8.1 Maintenance records for any service, repair or modification which affects the safe performance of the equipment will be maintained and be reasonably available to the operator and maintenance personnel during work hours. Refer to the *S3NA-205-PR1 Equipment Inspections & Maintenance* program.
- 4.8.2 Maintenance records will be maintained on the site or project for mobile equipment.
- 4.8.3 Servicing, maintenance and repair of mobile equipment will not be done when the equipment is operating, unless continued operation is essential to the process and a safe means is provided.
- 4.8.4 All heavy equipment shall have a documented inspection and if necessary, repaired prior to use. **Operators** shall not operate heavy equipment that has not been cleared for use. All machinery and mechanized equipment will be certified to be in safe operating condition (refer to *S3NA-309-FM1 Certification of Machinery and Mechanized Equipment*) by a competent person (refer to *S3NA-202-PR1 Competent Person Designation*) seven days prior to on-site operation, and is valid for one year.
- 4.8.5 All heavy equipment shall be inspected at a minimum to the manufacturer's recommendations prior to each work shift. All defects shall be reported to the **Supervisor/Project Manager** immediately. Inspection records shall be maintained at the site. If a manufacturer's or company-specific inspection checklist is not provided, use the Heavy Equipment Pre-Operation Inspection Checklist (*S3NA-309-FM2 Heavy Machinery Pre-Operation Checklist*).
- 4.8.6 Defective heavy equipment shall be immediately taken out of service until repaired.

4.9 Fueling and batteries

- 4.9.1 A well-ventilated area shall be used for refueling.
- 4.9.2 Only the type and quality of fuel recommended by the engine manufacturer shall be used.
- 4.9.3 Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.
- 4.9.4 No one shall spill fuel on hot surfaces. Any spillage should be cleaned before starting an engine.
- 4.9.5 Spilled fuel shall be cleaned with cotton rags or cloths; do not use wool or metallic cloth.
- 4.9.6 Open flames, lighted smoking materials, or sparking equipment shall remain well away from the fueling area.
- 4.9.7 Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.
- 4.9.8 Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.
- 4.9.9 The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.
- 4.9.10 Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.

- 4.9.11 Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent buildup of a static charge.
- 4.9.12 Batteries shall be serviced in a ventilated area while wearing appropriate Personal Protective Equipment.
- 4.9.13 When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first.
- 4.9.14 When installing a battery, the battery shall be connected ground post last.
- 4.9.15 When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.
- 4.9.16 When charging a battery, the power source shall be turned off to the battery before either connecting or disconnecting charger loads to the battery posts.
- 4.9.17 Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water.
- 4.9.18 Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention shall be sought immediately.
- 4.9.19 To avoid battery explosions, the cells shall be filled with electrolytes. A flashlight (not an open flame) shall be used to check water electrolyte levels. Avoid creating sparks around batteries by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least 25 feet (7.6 meters) away from battery-charging stations.

5.0 Records

- 5.1 Inspection records shall be maintained with the equipment.

6.0 Attachments

- 6.1 S3NA-309-WI1 Brokk180 Safety Card
- 6.2 S3NA-309-FM1 Certification of Machinery and Mechanized Equipment
- 6.3 S3NA-309-FM2 Heavy Machinery Pre-Operation Checklist

Americas

Brokk 180 Safety Card

S3NA-309-WI1

1.0 Objective/Overview

- 1.1 The Brokk 180 is an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating. This machine includes attachments designed exclusively for demolishing work (e.g., grapple, bucket, hydraulic hammer, etc.). By using the remote control unit, an operator can move the machine and attachments in different directions and speeds from afar.

2.0 Potential Hazards

- 2.1 Flying debris
- 2.2 Crush/impact/pinch from extendable boom, tracks, and tipping over
- 2.3 Electrocutation from subsurface utilities (when excavating)
- 2.4 Noise



3.0 Safe Operating Guidelines

- 3.1 Prior to use, complete a pre-operation inspection to determine if the unit is in safe working condition.
- 3.2 Position the unit to safely perform the intended task, then deploy the outriggers to stabilize the unit.
- 3.3 Confirm that the operator knows what the lifting capacity is; do not exceed the lifting capacity.
- 3.4 Complete a subsurface utility clearance prior to excavating.
- 3.5 Establish a minimum 15-foot (4.5-meter) clearance around the unit while operating.
- 3.6 Do not allow debris to build up around the unit. Maintain good housekeeping practices.
- 3.7 Prior to removing debris from under the boom, stop, disengage the unit, and position the boom so that the attachment is at rest on the ground.
- 3.8 Personnel operating the unit with the remote control device will be properly trained and certified by a competent person.
- 3.9 The operator will be able to maintain line of sight visual contact with the unit at all times to assess hazards and site security.
- 3.10 Maintenance in excess of preventive maintenance activities (e.g., lubrication, replenishing fluids, etc.) will be performed by manufacturer personnel ONLY.
- 3.11 All operations will comply with the manufacturer's recommended policies.

4.0 Training Requirements

- 4.1 Review of applicable Standard Operating Procedures.
- 4.2 Complete knowledge and understanding of remote control functions.
- 4.3 Review and follow manufacturers' recommended policies and practices.

5.0 Personal Protective Equipment (Level D ensemble)

- 5.1 Class II (minimum) American National Standards Institute/Canadian Safety Association Safety Vest
- 5.2 Hearing protection (ear plugs and/or ear muffs)
- 5.3 Leather gloves

6.0 Other Safety Tips

- 6.1 Never stand under a raised boom.
- 6.2 Pay close attention to power cords for potential tripping hazard and equipment entanglement.

Americas

Certification of Machinery and Mechanized Equipment S3NA-309-FM1

1.0 General Guidelines

- 1.1 Subcontractor equipment shall comply with all applicable legislative requirements, local, State, Federal, Provincial, Territorial for motor vehicles and material handling heavy equipment.
- 1.2 Certification shall be obtained for all subcontractor machinery and mechanized equipment prior to but within seven calendar days in advance of use on the project site.
- 1.3 Heavy equipment includes, but is not limited to, drill rigs, front-end loaders, backhoes, trackhoes, bulldozers, forklifts, and similar equipment used for the implementation of the project Statement of Work.

2.0 Equipment Safety Inspections

- 2.1 The following presents general guidelines for certifying equipment is in safe operating condition before activities commence at the site and during site operations. The following guidelines are not meant to be all-inclusive.
 - 2.1.1 All machinery and mechanized equipment will be certified to be in safe operating condition (using the attached form) by a competent individual seven days prior to on-site operation. This certification is valid for one year.
 - 2.1.2 Equipment will be inspected on a daily basis by the owner/operator and daily logs will be maintained. All discrepancies shall be corrected prior to placing the equipment in service.
 - 2.1.3 Inspections shall include, but are not limited to, all hydraulic lines and fittings for wear and damage, all cable systems and pull ropes for damage and proper installation, exhaust systems, brake systems, and drill controls, etc.
 - 2.1.4 Drill rigs and related support equipment and vehicles shall be inspected by the driller in charge on a daily basis. These inspections shall be recorded on the Daily Drill Rig Checklist or on equivalent subcontractor forms.
 - 2.1.5 Exhaustive preventive maintenance shall be conducted for all equipment according to manufacturer recommendations and/or the subcontractor's internal policies, schedules, and equipment Standard Operating Procedures.
 - 2.1.6 Only designated qualified persons shall operate machinery and mechanized equipment.
 - 2.1.7 The contractor shall maintain records of tests and inspections at the site and shall make the records available upon request of the designated authority; the records shall become part of the official project file.
 - 2.1.8 Equipment found to not be in safe operating condition or to have a deficiency that affects the safe operation of the equipment shall immediately be taken out of service and its use shall be prohibited until safe conditions have been corrected.
 - 2.1.9 All equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.
 - 2.1.10 Equipment with an obstructed rear view must have an audible alarm that sounds when equipment is moving in reverse.

TO: AECOM

DATE:

FROM:

Project Name:

Project Location:

1. This form provides certification of machinery and mechanized equipment to be used on the referenced project for the following work:

Description of equipment work:	
Project site:	
Subcontractor providing equipment: Address:	
Dates (duration) of equipment work:	

2. Inspection and certification of machinery and mechanized equipment, as required by AECOM, has been made prior to but within seven calendar days in advance of use on the project site. Recertification will be required for equipment that is used on the project site for more than one year.

Identification of equipment (make, model, serial no.)		Date of Certification
1		
2		
3		

3. The above listed equipment has been inspected and tested as indicated above, and is CERTIFIED TO BE IN SAFE OPERATING CONDITION BY THE FOLLOWING COMPETENT INDIVIDUAL:

Name		Title
Company		
Signature		Date

4. If there are any questions regarding this certification, please contact the following AECOM representative:

Americas

Heavy Equipment Pre-Operation Checklist

S3NA-309-FM2

Project Name/Location:															
Equipment Number/Name:							Equipment Make/Model:								
Hour meter reading:															
Check the following as appropriate	Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date		
	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A
1. Operator qualified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Overhead guard (ROPS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Horn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Lights	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Parking brake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Service brakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Steering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Oil level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Hydraulic oil level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Radiator fluid level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Major fluid leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Windows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Backup alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Tires (visual)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Seat belts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Project Name/Location:																
Equipment Number/Name:							Equipment Make/Model:									
Hour meter reading:																
Check the following as appropriate		Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date		
	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	
16. Fuel leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17. Fire extinguisher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18. Fuel lines secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
19. Electrical lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20. Exhaust components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:																

Definitions:

SAT = Satisfactory; in working order

UNSAT = Unsatisfactory; not in working order/damaged

N/A = Not Applicable

Wildlife, Plants and Insects

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.

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 WP-001-PR Firearms Standard
- 3.2 S2-032-PR1 Weapons Safety
- 3.3 S3NA-004-PR1 Incident Report
- 3.4 S3NA-208-PR1 Personal Protective Equipment Program
- 3.5 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.6 S3NA-511-PR1 Heat Stress
- 3.7 [Public Health Agency of Canada on Ticks and Lyme Disease in Canada](#)
- 3.8 [Public Health Agency of Canada on West Nile Virus](#)
- 3.9 [United States Center for Disease Control \(CDC\) on Lyme Disease](#)
- 3.10 [New York State Department of Health, 2007. Health Advisory, Tick and Insect Repellents.](#)
- 3.11 [Spectrum Brands, 2007. Personal Insect Repellent Products.](#)
- 3.12 [U.S. Centers for Disease Control and Prevention, 2004. Tick Management Handbook](#)

- 3.13 [U.S. Environmental Protection Agency, 2006. Permethrin Facts: Preregistration Eligibility Decision Fact Sheet](#)
- 3.14 [U.S. National Pesticide Information Center, 1997, National Pesticide Telecommunications Network Fact Sheet for Permethrin](#)
- 3.15 [U.S. Environmental Protection Agency, 2005. New Pesticide Fact Sheet, Picaridin](#)

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project 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.
- If biological hazards are identified as an exposure risk in the workplace, control measures that may be applied at the project site will be implemented to reduce the potential for employees to be exposed to injuries and illnesses while working.
- If the exposures cannot be eliminated or managed with engineering controls, the **Project Manager** or **Supervisor** will approve the use of Personal Protective Equipment (PPE) and protective repellents and lotions and ensure that exposed employees have and use these products.
- Approve the costs associated with the PPE and materials necessary to protect employees from the biological hazards covered by this procedure.

4.1.2 Region Safety, Health and Environment (SH&E) Manager

- Participate in incident reporting and investigations when appropriate.
- Work with Office Manager (Operations), SH&E Department and project Safety Professionals provide training and guidance to employees consistent with this procedure.
- During the performance of project site visits, assess the precautions being taken against the requirements of this procedure.
- Assist project teams in identifying hazards and selecting appropriate control measures.

4.1.3 Office Managers (Operations)

- Assure implementation of this procedure in their regions and offices.
- Participate in incident reporting and investigations when appropriate.

4.1.4 Field Staff / Employees

- Participate in required training on this procedure.
- Participate in the development of THAs for the project, identify control measures to limit exposure and request PPE, repellents, and protective lotions required by this Procedure.
- Obtain approval from Project 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 as detailed within the Procedure.
- Participate in incident reporting and investigations when appropriate.

4.2 Overview

- 4.2.1 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 and as part of the THA, in accordance with the *S3NA-209-PR1 Project Hazard Assessment and Planning*, conducted by the project team, additional consideration must be given to other biological hazards.
- 4.2.2 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.
- 4.2.3 If additional biological hazards are identified, the project team should contact the Region SH&E Manager to discuss the hazards and identify effective control measures that can be implemented at the project site.

4.3 Employee Sensitivity

- 4.3.1 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. Staff 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.
- 4.3.2 Employees / Field Staff also need to consider whether they are sensitive to the use of insect repellents.

4.4 Planning and Hazard Assessment

- 4.4.1 The AECOM project team shall ensure 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 task hazard analysis (THA) planning process and conveyed to AECOM employees conducting the field work (also referred to as field staff). This information shall be communicated in the site-specific Safe Work Plan (SWP), Health and Safety Plan (HASP), the THA, pre-project kickoff meetings, and tailgate meetings at the project site.
- 4.4.2 It is important to note that the precautions to be taken by AECOM 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 project-specific hazard assessments in accordance with *S3NA-511-PR1 Heat Stress*.
- 4.4.3 During the preparation of the project-specific SWP, HASP and project specific THA, Project Managers, Supervisors, and the project staff will determine what biological hazards might be encountered during the project and will 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.
- 4.4.4 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.
- 4.4.5 The hazard assessments must 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.
- 4.4.6 Employees in the field where biological hazards exist will 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 protective measures implemented.

4.4.7 A decision flow chart and table for determining the potential for biological hazards in the U.S. has been provided in *S3NA-313-W11 Biological Hazard Assessment Decision Flow Chart Hazard Assessment (U.S.)*.

4.4.8 Restrictions:

- In accordance with the Global Safety Department standards, no firearms or weapons are allowed to be used without express permission by the Region Executive and chief Security Officer, refer to the *WP-001-PR Global Firearms Standard*.
- No weapons related work shall occur without an assessment that includes appropriate hazard control measures and training, refer to the *S2-032-PR1 Weapons Safety*.
- 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.

4.5 Habitat Avoidance, Elimination, and/or Control

4.5.1 Ticks, Spiders and other Insects

- The most effective method to manage worker safety and health is to eliminate, avoid and/or control hazards. Clearing the project site 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, spiders, and poisonous plants 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 **Project 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.
- When projects must 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. **Project 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.

4.5.2 Poisonous Plants

- If poisonous plants are identified in the work area, **field staff** will mark the plants using either flags or marking paint, and discuss what the specific indicator will be to signal to other **field staff** to avoid the designated area. If **field staff** decide to use ground-marking paint to identify poisonous plants, they should discuss this tactic with the **Project Manager** (and Client as appropriate) to gain 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 will need to occur with the **Project 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.

- **Field staff** 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 **Region SH&E Manager**. If a SWP or HASP is prepared for the project, the clearing procedure should be included and the required PPE specified.

4.5.3 Wildlife Hazards (Wild Animals, Reptiles and Birds)

Staff must not work alone in areas where the risk of an encounter with dangerous wildlife is high. Wildlife handling must only be completed under direct supervision of an experienced individual. Refer to the following work instructions for more specifics on prevention:

- *S3NA-313-WI11 Large Carnivores*
- *S3NA-313-WI12 Bear Safety*
- *S3NA-313-WI13 Small Mammals*
- *S3NA-313-WI14 Snakes*
- *S3NA-313-WI15 Alligators*

4.5.4 Bird Droppings

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.

4.6 Insects

4.6.1 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.

4.6.2 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with them. 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.

4.6.3 Ticks

- Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will insert mouthparts to drink blood. 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 *S3NA-313-WI2 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.
- 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.

- 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, contact AECOM reporting line 1 (800) 348-5046 and asked to be connected to WorkCare for medical support. If this service is unavailable, contact your personal physician or a local medical clinic.
 - Canada – National Microbiology Laboratory (NML) (Phone: (204) 789-2000; email: ticks@phac-aspc.gc.ca). The NML will conduct diagnostic testing for the Lyme disease agent as well as several other disease-causing agents. The NML results will not only benefit anyone bit by the tick, but will also assist the NML in their goal to accurately map the distribution of the tick species and associated diseases in Canada.
 - U.S. – IGeneX, Inc. (Phone: (800) 832-3200; www.igenex.com). IGeneX will test the tick for the presence of the Lyme bacteria. They also test ticks for *Babesia microti* and/or *Babesia duncani* (formerly WA-1), Ehrlichia, Bartonella henselae and Rickettsia (Rocky Mountain Spotted Fever). All tick testing should be coordinated through WorkCare, AECOM's Corporate medical provider using the *S3NA-313-FM1 Tick Test Request Form*.
- 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.

4.6.4 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.

4.6.5 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 *S3NA-313-W/3 Poisonous Spider Identification*.

4.6.6 Mosquitoes

- 4.6.6.1 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.
- 4.6.6.2 CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk to field staff. 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:
 - Eastern Equine encephalitis
 - Western Equine encephalitis
 - West Nile Virus
 - St. Louis encephalitis
 - La Crosse encephalitis

4.6.6.3 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. Positive cases of West Nile Virus have been confirmed throughout North America since 2007.

4.6.6.4 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 *S3NA-313-W14 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.6.7 Bees 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 and if you locate insect back away without disturbing. Avoid reaching into areas where visibility is limited".
- If stung by a wasp, bees, 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. 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.

4.6.8 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.

4.6.9 Poisonous Plants

4.6.10 Plants that field staff should recognize and take precautions to avoid include: poison sumac, poison ivy (terrestrial and climbing), poison oak, giant hogweed¹ (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 *S3NA-313-W15 Plants of Concern* for information on locations where some of these poisonous plants are found in the U.S.

- Poisonous plants including poison ivy, oak and sumac, which contain the oil urushiol that produces a rash, can lead to dermatitis and infections. Exposure to urushiol produces a rash that can be irritating and cause the exposed employee to scratch the affected area, increasing susceptibility for an infection. It should be noted that each time an employee is exposed to urushiol the severity of the reaction increases. In cases that involve severe rashes, medical treatment may be necessary to control the rash.
- 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 *S3NA-313-W16 Wild Parsnip Identification* for additional information and photos of wild parsnip.

¹ Phytodermatiti producer: keep skin covered and wash well after exposure

- Of the toxic plants in the cashew family, poison ivy (*Rhus radicans*) is most widespread. It grows as in a variety of forms from a low sprawling shrub, dense ground cover, and 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 nearly all parts of the plant. Touching the plant causes an itchy skin rash that shows up several days following contact. People have a wide range of reactions which in severe cases can lead to oozing blisters on large parts of the body. Some people apparently never react and others who have never had a reaction may develop an allergy after years of frequent contact.
 - 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*).
- 4.6.11 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.
- 4.6.12 Giant hogweed presents the most serious health risk. Field staff should learn to recognize and avoid it if encountered.
- 4.6.13 Employees / Field Staff who develop a rash as a result of exposure to poisonous plants shall report the exposure immediately to their Supervisor or Project Manager who will then forward the report to the Region SH&E Manager.
- 4.7 Additional Wildlife Hazards (Wild Animals, Reptiles and Birds)
- 4.7.1 Refer to following for protection and prevention:
- S3NA-313-WI11 Large Carnivores
 - S3NA-313-WI12 Bear Safety
 - S3NA-313-WI13 Small Mammals
 - S3NA-313-WI14 Snakes
 - S3NA-313-WI15 Alligators
- 4.7.2 Bird Droppings
- Bird excrement may be encountered due to the nesting of pigeons and other birds and winged animals (e.g., bats) on or in structures. 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 *S3NA-313-WI10 Bird Droppings Safe Work Practices*.

4.8 Personal Protective Equipment (PPE)

- 4.8.1 The selection of PPE is dependent on the hazard present and a Task Hazard Analysis (THA) should be conducted to determine situation-specific PPE required refer to *S3NA-208-PR1 Personal Protective Equipment Program*.
- 4.8.2 At a minimum, in addition to any project-specific PPE, long sleeves and pants should be worn on field projects where the risk of biological encounter exists.
- 4.8.3 PPE for insects should include insect repellent, bug nets, bug jackets, or similar deterrents. Socks should be pulled over pant legs where the threat of exposure is anticipated.
- 4.8.4 Epi-pens² or other personal medication should be carried by those staff that is aware that anaphylactic shock is a possibility for them.

4.9 Personal Precautions and Personal Protective Measures

4.9.1 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).
- Wear protective clothing.
- 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.

4.9.2 Insects, Spiders, and Ticks

- Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
- Use of Permethrin to treat field clothing.
- Application of insect repellent to clothing and/or exposed skin.
- Routine personal checks.
- Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If stung by an insect or bitten by a spider or tick, attempt to identify the attacker and 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.
- 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, **field staff** can apply DEET to their skin and let dry prior to putting FRC on, or 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.

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.*

4.9.3 Poisonous Plants

- **Field staff** conducting clearing, grubbing, or similarly disturbing work activities in areas where poisonous plants exist shall wear either long-sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. **Field Staff** must not touch exposed skin (neck and face) with potentially contaminated gloves. Tyvek® and gloves worn to protect from exposure to poisonous plants will 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.
- For dermatitis caused by poison ivy, poison oak, or poison sumac, calamine lotion is effective.
- Work boots will be decontaminated with either soap and water or a cleansing agent such as Tecnu® cleanser.
- Remember that in the fall and winter the hazard still exists in the form of stubble and roots.
- **Employees / Field Staff** who develop a rash as a result of exposure to poisonous plants shall report the exposure immediately to their **Supervisor** or **Project Manager** who will forward the report to the **Region SH&E Manager**.

4.9.4 PPE Recommendations

The following recommendations may be considered by the project team to determine if the use of PPE is necessary for the type of work planned:

- Disposable gloves may be cotton, leather, or synthetic materials and must not be reused after removing.
- Clearing activities present the greatest risk to **field staff** exposure but reduce the risks once completed. Recommendation – Use full protection from ticks and insects during the clearing activities including insect repellents, Tyvek® coveralls, and gloves.
- If the foliage being cleared includes poisonous plants, exposed skin will 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.
- Work in habitats with direct exposure to ticks, mosquitoes, and poisonous plants is likely and the scope of work does not allow for worksite control measures like vegetative clearing: Recommendation – Full protection from biological hazards including insect repellents, Tyvek® coveralls or full-length clothing, poisonous plant barrier creams and wipes, and gloves.
- Work in habitats with direct exposure to ticks and mosquitoes and no exposure to poisonous plants is likely and the scope of work typically does allow for worksite control measures like vegetative clearing: Recommendation – Protection including insect repellents and Tyvek® coveralls or full-length clothing.
- Work in habitats with direct exposure to poisonous plants and no exposure to ticks or insects is likely and the scope of work does not allow for worksite control measures like vegetative clearing: Recommendation – Full protection from poisonous plants including insect repellents, Tyvek® coveralls or full-length clothing, poisonous plant barrier creams and wipes, and gloves.
- Industrial/Commercial/Office Facilities – Direct contact with biological hazards is considered unlikely or low risk: Recommendation – PPE for biological hazards are not required; however, Tyvek coveralls and insect repellent should be available if exposure to spiders, flying insects, or other biological hazards is encountered.
- Work in areas where no biological hazards are expected because of the local environment, winter weather, or property development: Recommendation – PPE for biological hazards is not

required; however, Tyvek® coveralls and insect repellent should be available if exposures to spiders, flying insects, or other biological hazards are encountered.

4.9.5 Selection and Configuration of Field Clothing

4.9.5.1 See *S3NA-313-W17 Configuration Clothing for Protection* against ticks and insects for illustrations and instructions for configuring, taping, and tucking clothing.

4.9.5.2 At a minimum, field staff will wear long-legged pants and long-sleeve shirts or Tyvek® coveralls to reduce the amount of exposed skin when biological hazards are identified at the work site. Gloves will also be worn consistent with the recommendations of the site-specific SWP, HASP and/or THA to minimize hand exposure.

4.9.5.3 Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically treated clothing will be taped to the work boots.

4.9.5.4 Chemical Treatment of Field Clothing

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.

4.9.5.4.1 Lemon Eucalyptus

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.

4.9.5.4.2 DEET

Note that DEET will reduce the effectiveness of FRC and should not be applied to this clothing. If working in FRC, field staff can apply DEET to their skin prior to putting FRC on, or 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.

4.9.5.4.3 Permethrin

- When selected as part of a project's PPE requirements, the **AECOM Project Manager** shall ensure that field teams wear clothing treated with the chemical Permethrin, which is an insecticide with repellent properties registered with the Environmental Protection Agency and recommended by the CDC. Information regarding the toxicity and product safety of Permethrin is provided in *S3NA-313-W18 Insect Repellent Active Ingredient Product Information*. 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) persons treatment of their personal clothing using 0.5 percent Permethrin spray. AECOM strongly recommends the first option (**field staff** 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 *S3NA-208-PR1 Personal Protective Equipment Program* and with the approval of your **Supervisor** or **Project Manager**. For more information visit the AECOM Americas SH&E website.

- 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 **field staff** 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 must be applied directly to the skin. Costs for clothing shall be charged to projects as a consumable item. If charging to the project is not possible, the charges should be managed as an operational expense. **Supervisor or Project Manager** approval is required prior to purchase.
- If the **employee / field staff** opts not to utilize chemically pre-treated clothing while potentially exposed to insects, spiders and/or ticks, they must 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 organic alternative to their work clothing.

4.9.5.5 Manual Treatment of Field Clothing

- If clothing pre-treated with Permethrin is not available or not purchased prior to field work, field staff may manually treat their clothing with Permethrin spray. The outer surfaces of all external clothing to be worn during field work should be treated with 0.5 percent Permethrin spray a minimum of 2 to 4 hours prior to field work (boots, trousers, shirt, jackets, rain gear) in accordance with recommendations provided by the New York State Department of Health presented in *S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application*. 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. Clothing treatment will last for approximately five wash cycles (check the specific instructions for the product used.) Purchase of PPE and Repellents and Lotions
- Costs for clothing, repellents, lotions, and other PPE shall be charged to projects as a consumable item. If charging to the project is not possible, the charges should be managed as an operational expense. **Supervisor or Project Manager** approval is required prior to purchase.
- Material Safety Data Sheets (MSDS) 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 MSDS should be obtained for the products used and placed into the office MSDS library and site-specific health and safety plans. Selected MSDSs are available on the AECOM Americas SH&E website.

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 Field Staff will 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 *S3NA-313-WI2 Ticks*, the tick should be preserved with the date and location of the bite noted, and retained for identification if medical treatment is needed as described in Section 4.10 of this Procedure.

- 4.10.4 The presence of an imbedded tick, rash, or abnormal reactions will be reported as an SH&E Incident to the Project Manager or Supervisor who will forward the report to the Region SH&E Manager for follow up.
- 4.11 Training
 - 4.11.1 Field staff must learn to recognize organisms that represent a threat in the regions in which they work – experienced field staff must provide on the job training to assist staff with hazard recognition.
 - 4.11.2 Field staff who have severe allergic reactions are strongly recommended to notify their Project Manager, field Supervisor and Employees of the potential for a reaction and demonstrate what medication they might need and how it is administered.
- 4.12 Remedies / Exposure
 - 4.12.1 If you suspect exposure to an irritant, identify the cause including obtaining a specimen if possible. Document the occurrence as a safety precaution if the exposure should lead to complications. There is a host of over the counter treatment options available for exposures to various biological hazards.
 - 4.12.2 Report the incident, call WorkCare for advice, or consult a private doctor if necessary, refer to the *S3NA-004-PR1 Incident Report* procedure for more specifics.

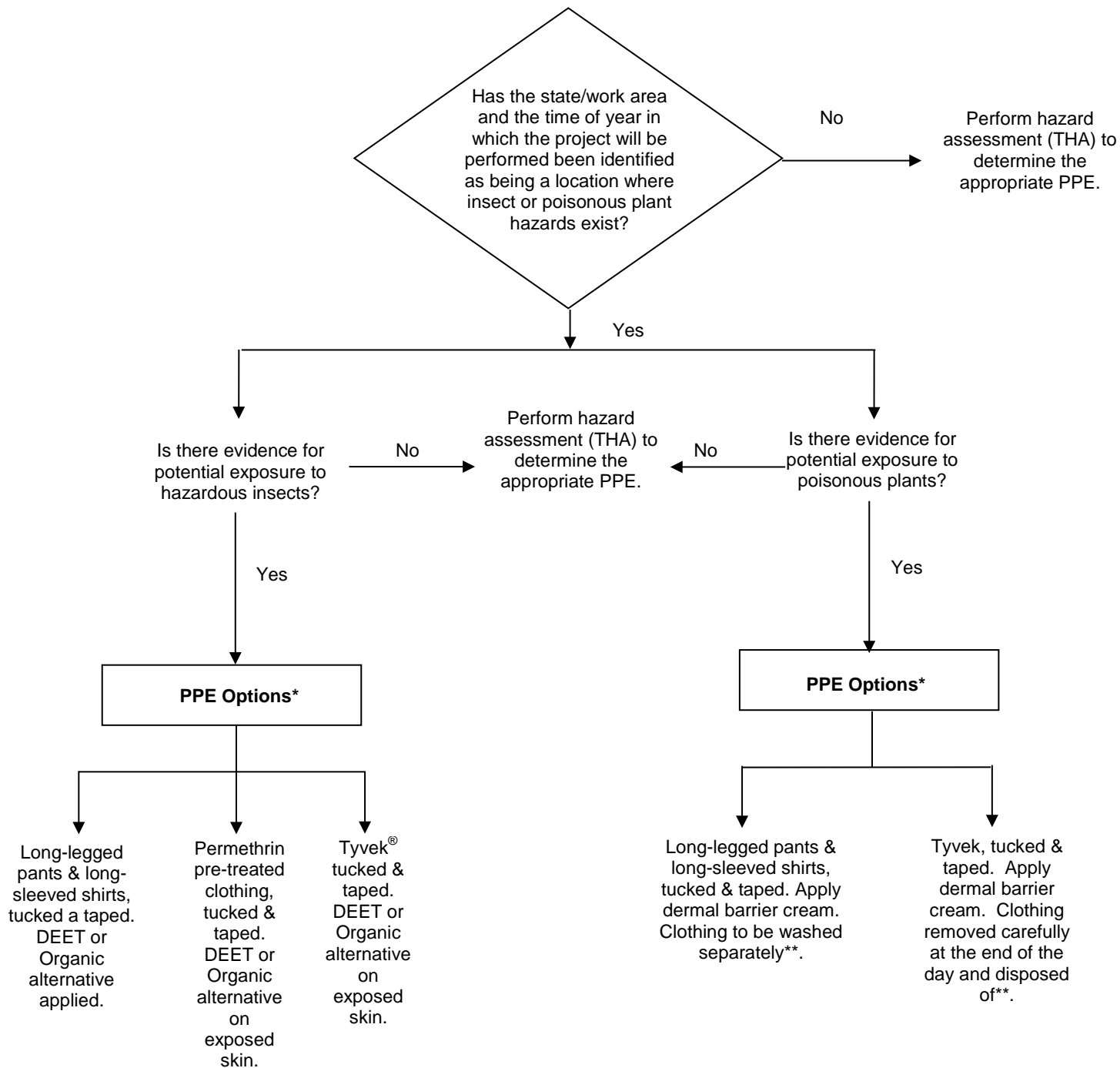
5.0 Records

None

6.0 Attachments

- 6.1 S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart
- 6.2 S3NA-313-WI2 Ticks
- 6.3 S3NA-313-WI3 Poisonous Spider Identification
- 6.4 S3NA-313-WI4 Mosquito Borne Diseases
- 6.5 S3NA-313-WI5 Plants of Concern
- 6.6 S3NA-313-WI6 Wild Parsnip Identification
- 6.7 S3NA-313-WI7 Configuration Clothing for Protection against ticks and insects
- 6.8 S3NA-313-WI8 Insect Repellent Active Ingredient Product Information
- 6.9 S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application
- 6.10 S3NA-313-WI10 Bird Droppings Safe Work Practices
- 6.11 S3NA-313-WI11 Large Carnivores
- 6.12 S3NA-313-WI12 Bear Safety
- 6.13 S3NA-313-WI13 Small Mammals
- 6.14 S3NA-313-WI14 Snakes
- 6.15 S3NA-313-WI15 Alligators
- 6.16 S3NA-313-FM1 Tick Test Request Form

Biological Hazard Assessment Decision Flow Chart (U.S.) S3NA-313-WI1



* 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.

** 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.

State by State Guideline for Exposure

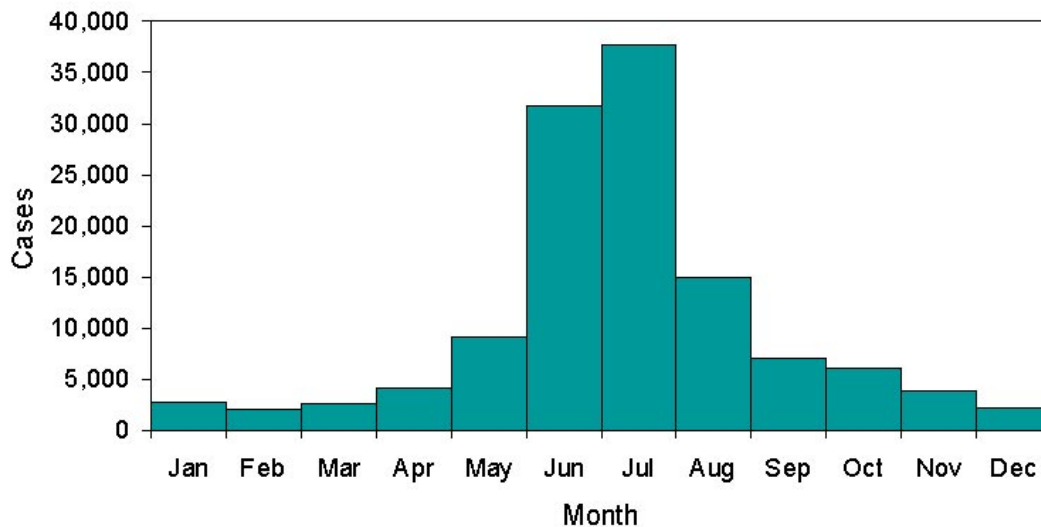
States	Tick-Borne Diseases	Mosquito-Borne Diseases	Poisonous Plants
Alabama	Year Round Low Risk	Year Round	Year Round
Alaska	No Risk	No Risk	No Risk
Arizona	No Risk	March - July	March - November
Arkansas	March - November	March - November	March - November
California	Low Risk	March - November	Year Round
Colorado	Low Risk	March - November	No Risk
Connecticut	March - November	Low Risk March - November	March - November
Delaware	March - November	Low Risk March - November	March - November
Florida	Year Round Low Risk	Year Round	Year Round
Georgia	Year Round Low Risk	Year Round	Year Round
Hawaii	No Risk	No Risk	No Risk
Idaho	No Risk	Low Risk March - November	No Risk
Illinois	March - November	March - November	March - November
Indiana	March - November	March - November	March - November
Iowa	March - November	March - November	March - November
Kansas	Low Risk	March - November	March - November
Kentucky	March - November	March - November	March - November
Louisiana	Year Round Low Risk	Year Round	Year Round
Maine	March - November	March - November	March - November
Maryland	March - November	Low Risk	March - November
Massachusetts	March - November	March - November	March - November
Michigan	March - November	March - November	March - November
Minnesota	March - November	March - November	March - November
Mississippi	Year Round	Year Round	Year Round
Missouri	March - November	March - November	March - November
Montana	Low Risk March - July	Low Risk March - July	No Risk
Nebraska	Low Risk	Low Risk	Low Risk
Nevada	Low Risk March - July	Low Risk March - July	Low Risk March - November
New Hampshire	March - November	March - November	March - November
New Jersey	March - November	March - November	March - November
New Mexico	No Risk	Low Risk March - July	No Risk
New York	March - November	March - November	March - November
North Carolina	March - November	March - November	March - November
North Dakota	No Risk	March - November	No Risk
Ohio	Low Risk March - November	March - November	March - November
Oklahoma	March - November	Low Risk March - November	March - November
Oregon	Low Risk March - November	Low Risk March - November	March - November
Pennsylvania	March - November	March - November	March - November

States	Tick-Borne Diseases	Mosquito-Borne Diseases	Poisonous Plants
Puerto Rico	???	Low Risk March - November	Year Round
Rhode Island	March - November	Low Risk March - November	March - November
South Carolina	March - November	Low Risk March - November	March - November
South Dakota	Low Risk March - November	March - November	March - November
Tennessee	March - November	March - November	March - November
Texas	Year Round Low Risk	Year Round	Year Round
Utah	Low Risk March - July	Low Risk March - July	No Risk
Vermont	March - November	Low Risk March - November	March - November
Virginia	Low Risk March - November	March - November	March - November
Washington	Low Risk March - November	Low Risk March - November	March - November
West Virginia	Low Risk March - November	March - November	March - November
Wisconsin	March - November	March - November	March - November
Wyoming	No Risk March - July	Low Risk March - July	No Risk

1.0 Background

- 1.1 The Public Health Agency of Canada works with the Provinces, health authorities and other experts on research to define and monitor the occurrence of the ticks that carry *Borrelia burgdorferi*, the bacterium that causes Lyme disease. In 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.
- 1.2 In Quebec, black-legged tick populations are becoming established in parts of the Monteregie and Estrie regions in the southeast of the province. In Ontario, populations can be found in Long Point; Point Pelee National Park; Rondeau Provincial Park; Turkey Point; Prince Edward Point National Wildlife Area and St. Lawrence Islands National Park in the Thousand Islands region of eastern Ontario. In Nova Scotia, black-legged tick populations are found in the Lunenburg, Bedford and Shelburne areas. An established population has also been found in the southeastern corner of Manitoba. Western black-legged ticks, on the other hand, are found in British Columbia; they are fairly widely distributed but populations are largest in the lower mainland, on Vancouver Island, and in the Fraser Valley.
- 1.3 Although the distribution of black-legged ticks in Canada appears to be limited, surveillance indicates that some of the established populations are spreading within certain areas of southern Canada. The potential expansion of localized tick populations makes it difficult to precisely define the geographic limits of any given population; however, people living in or visiting areas adjacent to established tick populations may have a greater chance of contact with blacklegged ticks. Although current evidence does not suggest a widespread distribution of blacklegged tick populations in Canada, the establishment of new populations appears to be an ongoing process. Hence, it is desirable to continue surveillance and to take precautions to reduce tick contact.
- 1.4 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). 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). Infection rates are often greater in tick populations that have been established for long periods of time (such as Long Point) compared to newly established ones. As many as 60 percent of the adult ticks at Long Point are infected; however, infection rates in adults are more often between 10 and 25 percent at the other localities where ticks are established. Partly because of differences in the types of hosts that they feed upon, infection rates of the Lyme disease agent in *Ixodes pacificus* are much lower (1-3 percent) than *Ixodes scapularis*.
- 1.5 While there is a higher risk of coming in contact with infected black-legged ticks in areas where populations are established, there is also a low risk of Lyme disease being contracted almost anywhere in Canada because migratory birds transport infected ticks over large geographic distances. Surveillance data indicates that about 12 percent of the ticks detected outside of areas where tick populations are established, and likely transported there on migratory birds, are infected with the agent of Lyme disease.
- 1.6 Source: <http://www.phac-aspc.gc.ca/id-mi/tickinfo-eng.php>

Figure 1 Reported Cases of Lyme Disease by Month of Illness Onset United States, 1992-2004



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.

http://www.cdc.gov/ncidod/dvbid/lyme/ld_rptmthofill.htm

2.0 Tick Removal Tips from CDC

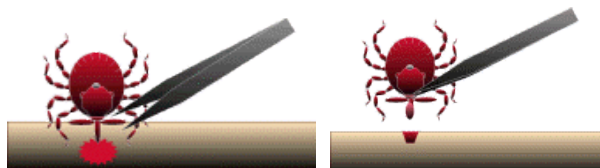
<http://www.cdc.gov/ncidod/dvrd/ehrlichia/Q&A/Q&A.htm>

3.0 To Remove Attached Ticks



- 3.1 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.
- 3.2 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.)
- 3.3 After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

- 3.4 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.
- 3.5 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.



4.0 Devices Designed for Removing Ticks

- 4.1 <http://www.tickkey.com/>
- 4.2 The Tick Tool - <http://www.ticktool.com/index.html>

5.0 Folklore Remedies Don't Work

- 5.1 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.

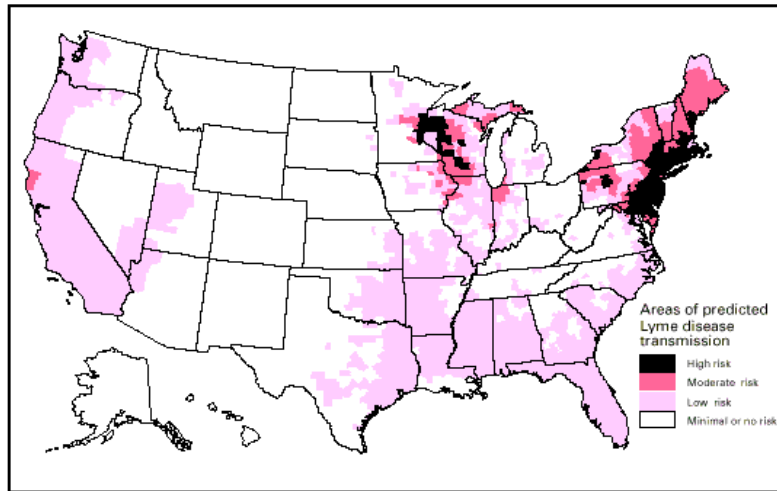
6.0 Information Regarding Common Tick-Borne Diseases

Table 1 Common Tick-Borne Diseases in the U.S. and Information Resources

Disease	Tick Species	CDC Informational Web Pages
Lyme disease	<ul style="list-style-type: none"> • Black-legged or deer tick • Western black legged tick 	http://www.cdc.gov/ncidod/dvbid/lyme/
Ehrlichiosis	<ul style="list-style-type: none"> • Lone star tick • Black-legged or deer tick • Western black legged tick 	http://www.cdc.gov/Ncidod/dvrd/ehrlichia/Index.htm
Rocky Mountain spotted fever	<ul style="list-style-type: none"> • American dog tick • Rocky Mountain wood tick • Brown dog tick 	http://www.cdc.gov/ncidod/dvrd/rmsf/index.htm

7.0 Distribution

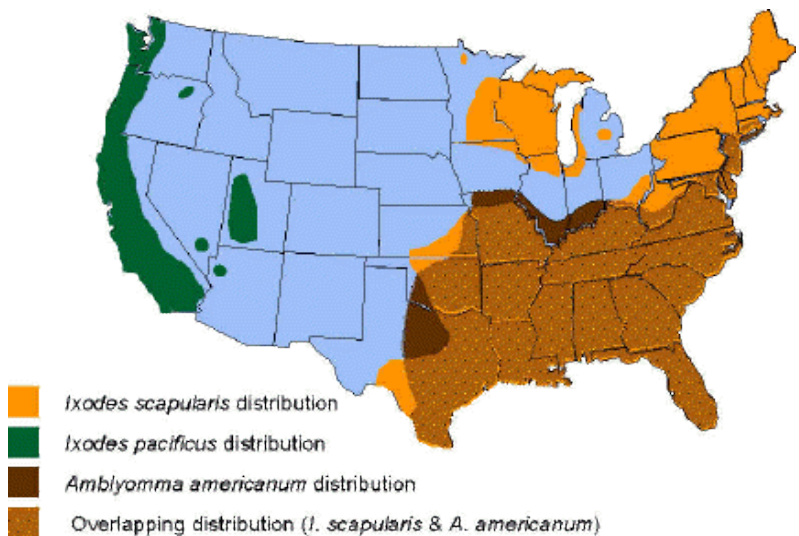
Figure 2 Distribution Map for Lyme Disease Risk, U.S.



Note: This map demonstrates an approximate distribution of predicted Lyme disease risk in the United States. The true relative risk in any given county compared with other counties might differ from that shown here and might change from year to year. Risk categories are defined in the accompanying text. Information on risk distribution within states and counties is best obtained from state and local public health authorities.

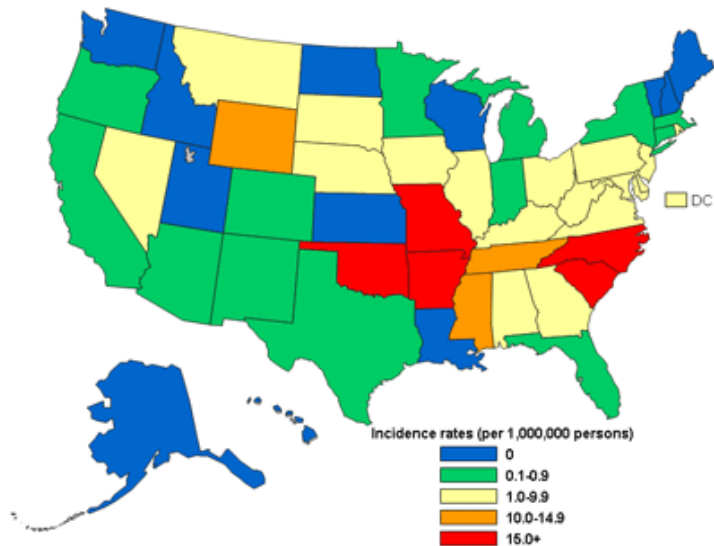
Source: CDC, <http://www.cdc.gov/ncidod/dvbid/lyme/riskmap.htm>

Figure 3 Distribution Map of Vector Tick Species for Human Ehrlichiosis, U.S.



Source: CDC, <http://www.cdc.gov/ncidod/dvrd/ehrlichia/Q&A/Q&A.htm>

Figure 4 Distribution Map of Annual Incidence of Rocky Mountain Spotted Fever, U.S



Data for calendar year 2002

Source: CDC, <http://www.cdc.gov/ncidod/dvrd/rmsf/Epidemiology.htm>

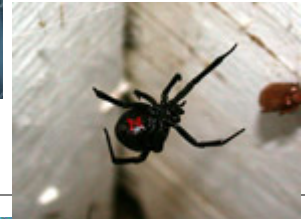
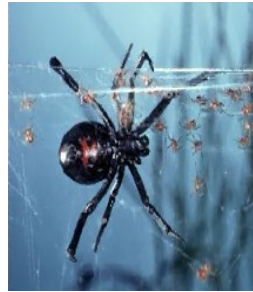
Americas

Poisonous Spider Identification

S3NA-313-WI3

Black Widow Spider

- 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.



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.

Additional U.S. Spider Identification charts are available at <http://www.termite.com/spider-identification.html>

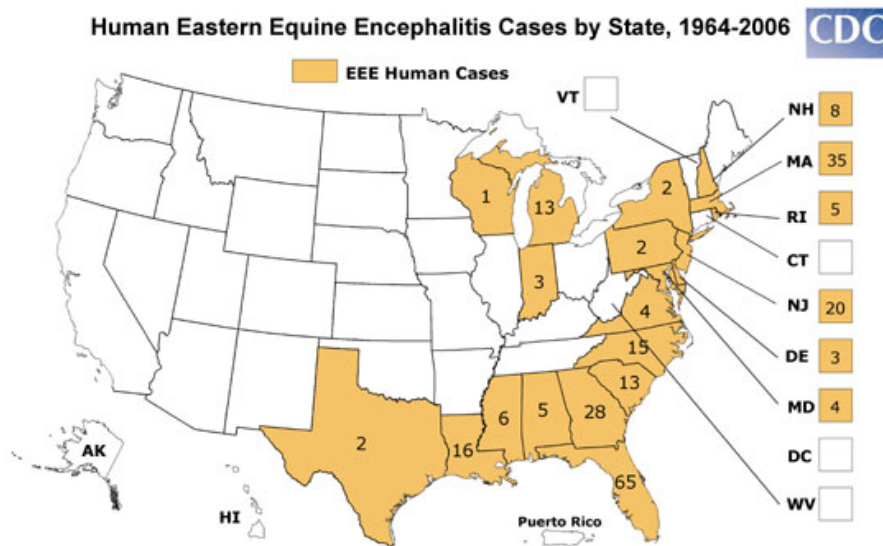
Mosquito-Borne Diseases

1.0 Background

- 1.1 CDC data indicates that mosquito-borne illnesses, including encephalitis, are a health risk to employees working in outdoor environments.
- 1.2 Mosquitoes pose a risk of causing infection with various forms of encephalitis and other diseases in AECOM employees. This section will focus on the transmission of encephalitis. West Nile encephalitis is an infection of the brain that is caused by a virus known as the West Nile virus.
- 1.3 If other mosquito-borne diseases are identified in the project area, the local Public Health Department and Center for Disease Control and Prevention (CDC) should be consulted to determine what diseases are present and exposure prevention recommendation.
- 1.4 According to the CDC, arboviral encephalitis is a virus that is “maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods”, e.g., mosquitoes. It exists in various forms in global distribution, and in four primary forms in the U.S.: 1) eastern equine encephalitis (EEE), 2) western equine encephalitis (WEE), 3) St. Louis encephalitis (SLE), and 4) La Crosse (LAC) encephalitis; all of which are transmitted by mosquitoes.
- 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.

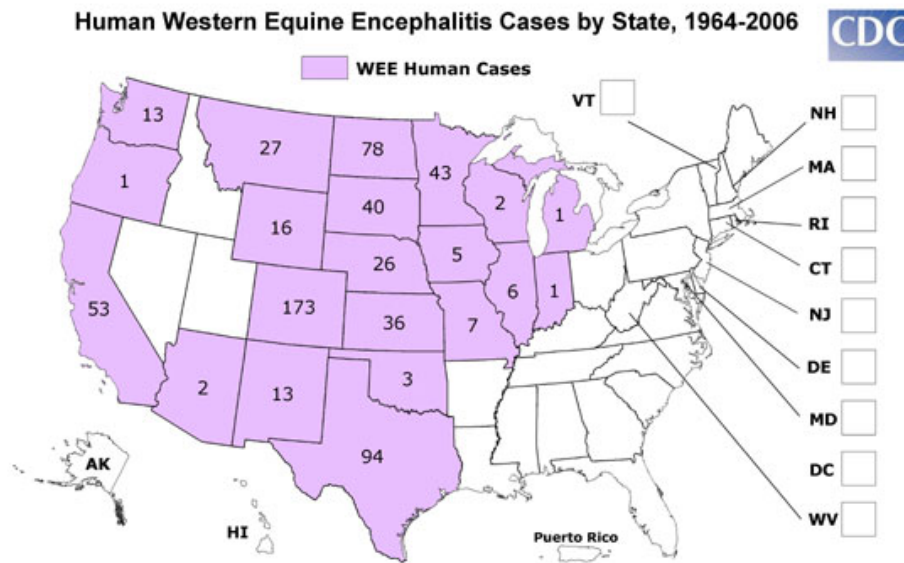
2.0 Distribution

Figure 1 Distribution Map for EEE Cases



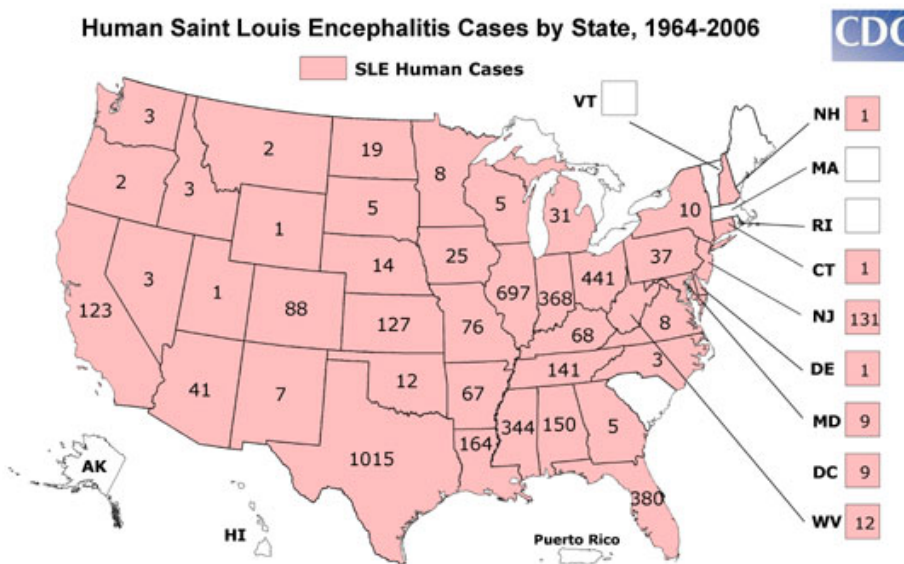
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/EEE_Map.jpg

Figure 2 Distribution Map for WEE Cases



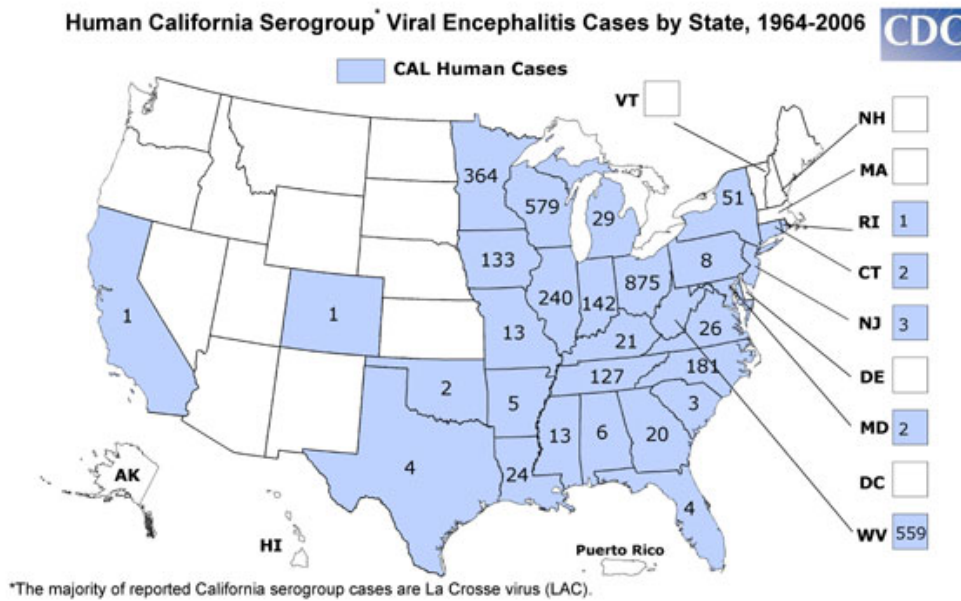
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/WEE_Map.jpg

Figure 3 Distribution Map for SLE Cases



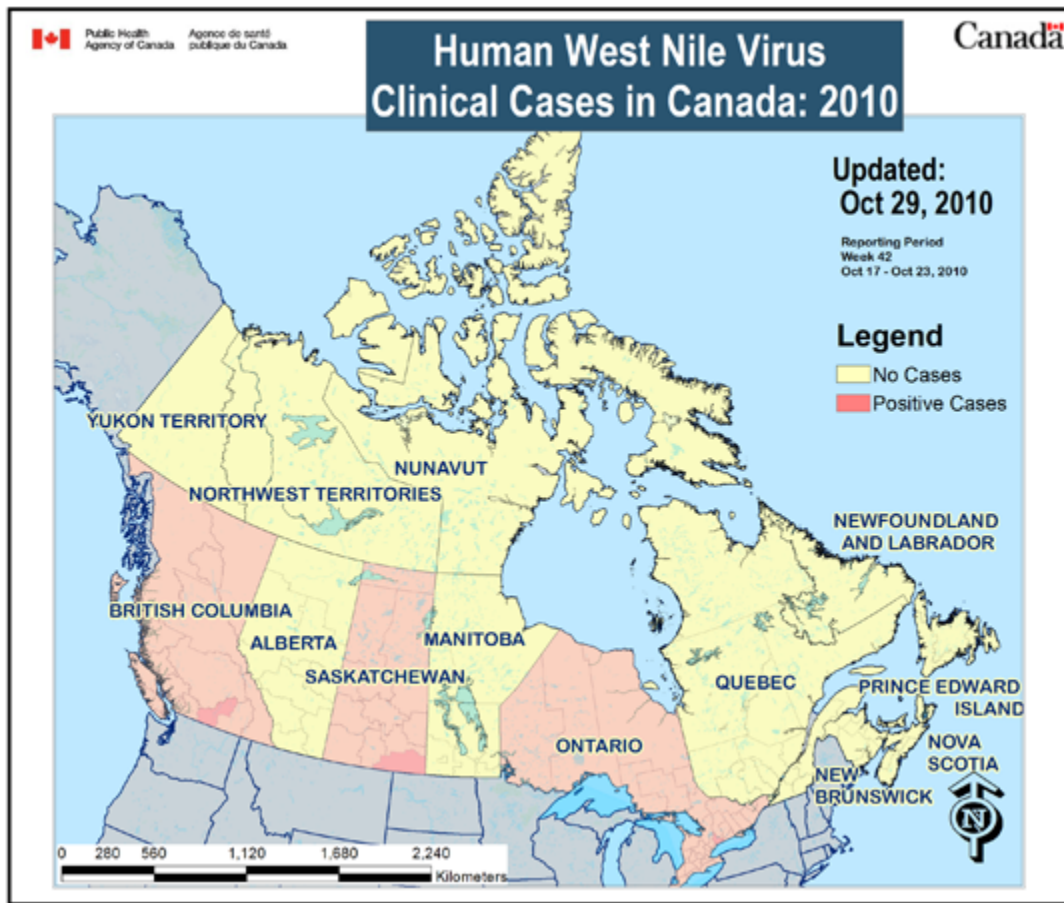
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/SLE_Map.jpg

Figure 4 Distribution Map for LAC Encephalitis Cases



Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/LAC_Map.jpg

Canadian Mosquito Borne Diseases



Source: <http://www.eidgis.com/wnvmonitorca/>

Disease	Distribution
California encephalitis	Canada-wide
Western equine encephalitis	Western Canada
Eastern equine encephalitis	Quebec, Ontario
St Louis encephalitis	Ontario, Quebec, Manitoba, Saskatchewan
Cache Valley	Ontario, Manitoba, Saskatchewan, Alberta

Source: [Paediatr Child Health. 2000 May-Jun; 5\(4\): 206-212.](#)

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.
- 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.

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.

Figure 1 Distribution Map for Poison Ivy

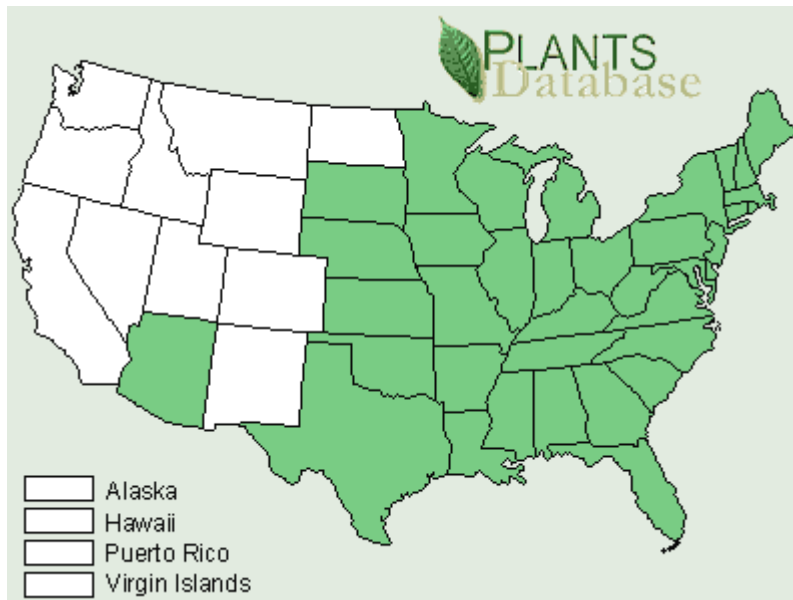


Figure 2 Distribution Map for Poison Oak

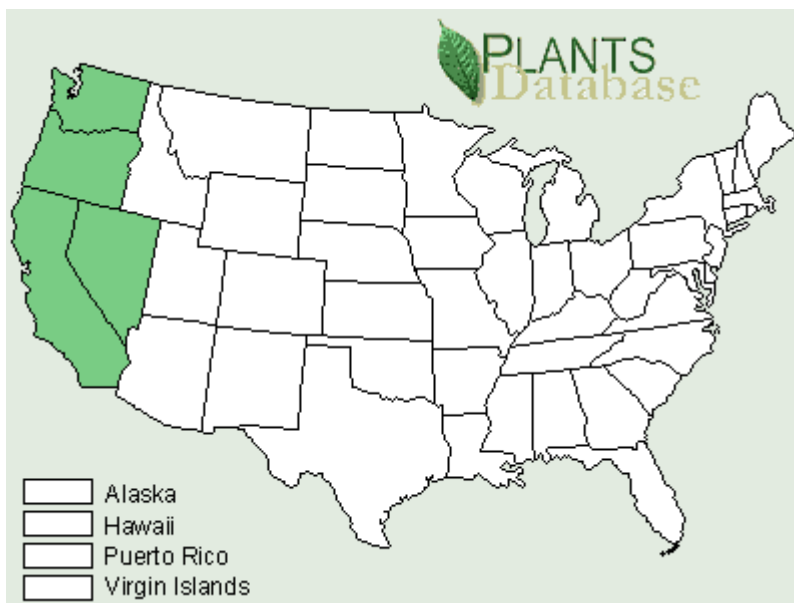
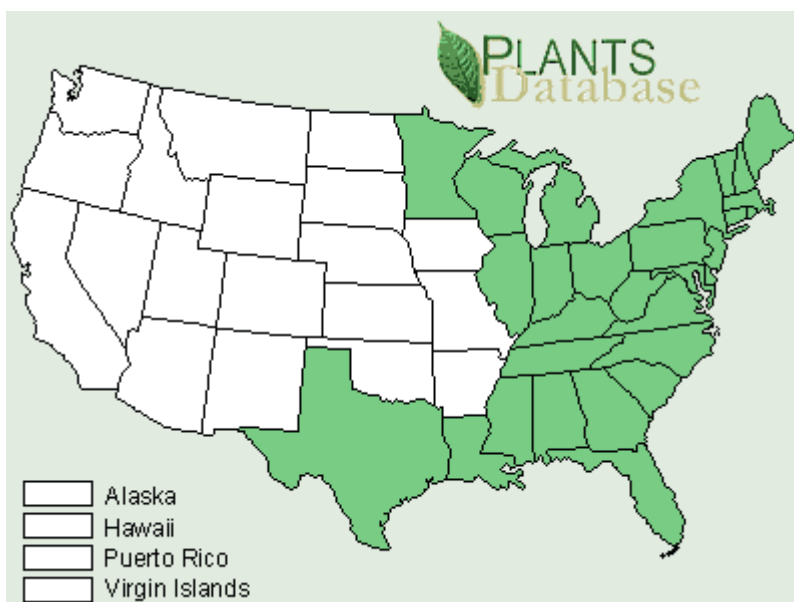


Figure 3 Distribution Map for Poison Sumac



Source for Figures 1, 2, and 3: <http://www.tecnuextreme.com/plant-map.htm>

Americas

Wild Parsnip Identification

S3NA-313-WI6

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.

More information can be found at www.co.becker.mn.us/dept/soil_water/wild_parsnip.aspx



Americas

Configuration Clothing for Protection Against Ticks and Insects

S3NA-313-WI7

1.0 Configuration of Clothing

- 1.1 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).



Insect Repellent Active Ingredient Product Information

1.0 Application of Insect Repellent

- 1.1 Immediately prior to the commencement of work in the field, an AECOM-approved insect repellent shall be applied to exposed skin, and to the outer surface of pant leg cuffs tucked into socks, shirt tails tucked into pants at the waist, and shirt cuffs.
- 1.2 Table 1 provides a list of AECOM-approved insect repellent active ingredients; employees may utilize any brand containing the minimum concentration of active ingredients as listed.
- 1.3 All products are registered with the U.S. Environmental Protection Agency and recommended by the Centers for Disease Control and Prevention.
- 1.4 Employees should select the AECOM-approved repellent which is best for them based on skin sensitivity/allergies, and personal preference, but be aware that reapplication frequency will be greater for Picaridin and lemon eucalyptus products.
- 1.5 Employees shall carefully read and comply with manufacturer recommendations and instructions on product labels prior to application. Repellent shall not be applied beneath clothing to minimize the potential for irritation and/or allergic reaction.
- 1.6 The chemical N,N-diethyl-*m*-toluamide (DEET) shall not be applied to Nomex™ fire retardant clothing as it reduces the effectiveness of the fabric.

Table 1 Approved Insect Repellents

Active ingredient and minimum concentration	Products Available	Approximate Duration of Effectiveness	Notes and Web Link to Product Safety Information
Permethrin (0.5%)	-Repel® Permanone -Coulston's Duranon™	2 weeks ¹	-Application to clothing and equipment only
DEET (23.8%)	-Deep Woods Off!® -Repel® Sportsmen Formula®	5 hours ²	-Cannot be applied to Nomex™ fabric
Picaridin (7%)	-Cutter Advanced™	4 hours ³	-Protection equivalent to approximately 10% DEET
Oil of Lemon Eucalyptus (30%)	-Repel® Lemon Eucalyptus	2 hours ²	-Protection equivalent to approximately 7% DEET -Natural, plant based product

¹ – New York State Department of Health, 2007

² – Fradin and Day, 2002

³ – Spectrum Brands, 2007

- 1.7 Repellent shall be reapplied multiple times daily over the course of the day at a frequency identified during the hazard assessment based on manufacturers' recommendations, the approximate effective period provided in Table 1, and other factors such as perspiration, precipitation, etc.
- 1.8 All approved repellents are available at most department or sporting goods stores.

Insect Repellent Active Ingredient Product Information

Product Safety Information

Facts about the repellants recommended by AECOM are available by clicking on the embedded link.

National Pesticide Telecommunications Network Fact Sheet: Permethrin and Picaridin

Picaridin



Picaridin Fact Sheet.pdf

Permethrin



Permethrin Fact Sheet.pdf

DEET



DEET Fact Sheet.pdf

Lemon Eucalyptus



Lemon Eucalyptus fact sheet.pdf

Permethrin Application

S3NA-313-WI9

1.0 Application Recommendations

- 1.1 Source: New York State Department of Health, 2007. Health Advisory, Tick and Insect Repellents. <http://www.health.state.ny.us/nysdoh/westnile/pdf/2737.pdf>
- 1.2 Products containing permethrin are for use on clothing only—not on skin. Permethrin kills ticks and insects that come in contact with treated clothes. It is effective for two weeks or more if the clothing is not laundered.

2.0 Treat Clothing Only– DO NOT APPLY TO SKIN.

- 2.1 Read carefully and follow manufacturer's recommendations for application.
 - 2.2 If you accidentally get the product on your skin, immediately wash with soap and water.
 - 2.3 Apply to clothing in a well-ventilated outdoor area, protected from wind.
 - 2.4 Only spray Permethrin products on the outer surface of clothing and shoes before you put them on - do not apply to clothing while it is being worn. Only spray enough product to lightly moisten the outer surface of the fabric causing a slight color change or darkening; do not saturate clothing. Do not exceed recommended spraying times. Pay special attention while treating socks, trouser cuffs and shirt cuffs to ensure proper coverage. Hang the treated clothing outdoors and allow clothing to dry for at least two hours (four hours under humid conditions) before wearing.
 - 2.5 Do not treat clothing more than once every two weeks. Launder treated clothing separately from other clothing at least once before retreating.
 - 2.6 Keep treated clothes in a separate bag. Those who frequent tick or mosquito habitats should consider having a set of clothes, preferably long-sleeved shirt, pants and socks that are used only in such settings. These clothes can be treated with a Permethrin-containing product according to the label directions, worn only when needed, and then placed in a separate bag when not in use. In hot weather, when long-sleeved shirt and pants may be uncomfortable, pants and jackets made of insect netting (either untreated or treated with repellent) can be worn. Such clothes are available in some sporting good stores and through outdoor equipment catalogs.
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1. U. S. Environmental Protection Agency. 1999. Office of Pesticide Programs List of Chemicals Evaluated for Carcinogenic Potential-August 25, 1999. Office of Pesticide Programs. Washington, DC.

Bird Droppings Safe Work Practices

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.

Large Carnivores

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

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 Security 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.
- Women should use internal sanitary protection, (i.e. tampons) when menstruating and burn all used sanitary products after usage. Keep all used sanitary supplies in sealed bags until you have a chance to burn them.
- 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 **Field Workers** 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** – You will trigger the bear's natural response to chase you. Bears are extremely fast and you cannot outrun a bear. (They are as fast as an Olympic sprinter, so if you are not faster than an Olympic sprinter, don't run! They can run 25 miles per hour [40 kilometers per hour] and you can't!) You cannot outswim a bear either.

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. The bear can quickly outrun you if it is so inclined.
- 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. Although grizzlies can climb trees, they are often not motivated enough to try. Very large grizzlies are not able to climb trees well. If grizzlies climb, they can go 9 to 13 feet (3 to 4 meters). Grizzlies will try and push trees over so do not climb a small tree.

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.

6.10 Playing Dead

- 6.10.1 Note: Playing dead is a very controversial topic among seasoned field personnel. Some will tell you to never play dead in any situation, others will swear that it is the only thing you should do. Playing dead is a personal choice that you will have to make.

- 6.10.2 If you play dead it is possible that you can prevent serious injuries if a chance encounter with a bear results in an attack. Playing dead may reduce the threat that you represent to the bear.
- 6.10.3 If you decide to play dead, it is important to protect your vital areas. The older information that is still found online states that the person should roll into a ball to protect their vital organs. This has been replaced and you are now advised to lie in the prone position. Lie flat on your stomach and lace your fingers behind your neck (to protect it), Spread your legs apart to provide stability if the bear tries to turn you over. Stay in this position. If the bear manages to roll you over, immediately roll back onto your stomach to protect your face, neck and vital areas. Do not try to resist or struggle as this will intensify or prolong the attack. Once the attack is over, **DO NOT MOVE** until the bear has left the area. Look around and be very sure that the bear is gone before moving. (If the bear is a female with cubs, she will leave and move her cubs to safety.) If the bear covers you with leaves and vegetation, it probably thinks you are dead. Grizzlies will often cover their prey with vegetation and leave the carcass to ripen for a few days.
- 6.10.4 It is important to note that if the bear attack is prolonged or if the bear begins to eat you, the attack has changed from what you may have first believed to be a defensive attack to a predatory attack. Fight back in a predatory attack. Concentrate your efforts on the face, eyes and nose of the bear.

Small Mammals

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 Trapping and Tagging Small Mammals. A RIC Standard for British Columbia. 1993. Dr. Todd Zimmerling.

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 Whenever a wild animal must be handled, the procedure must be accomplished as safely and quickly as possible.
- 6.3 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.
- 6.4 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.
- 6.5 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).

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 References

- 3.1 The Eastern Massasauga Rattlesnake Stewardship Guide. A resource and field guide for living with rattlesnakes in Ontario. Sponsored by the Government of Canada, and distributed on behalf of the Toronto Zoo and the Eastern Massasauga Rattlesnake Recover Team.
- 3.2 <http://www.rattlesnakes.us/>
- 3.3 <http://drdavidson.ucsd.edu/Portals/0/snake/Crotalus.htm>

4.0 Restrictions

- 4.1 Staff must not work alone in areas where the risk of a snake encounter is high.

5.0 Training

- 5.1 Staff must be notified of the hazard before work commences.




6.0 Safe Work Practice

- 6.1 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.
- 6.2 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.
- 6.3 Most snakes are non-aggressive and will only attack if immediately threatened.
- 6.4 Prevention
- 6.4.1 Before venturing out into the wilderness, familiarize yourself with the snakes in your area, both venomous and non-venomous species.
- 6.4.2 Learn which habitats the venomous species in your region are likely to be encountered in, and use caution when in those habitats.
- 6.4.3 Try as much as possible not to take a snake by surprise.


- 6.4.4 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.
- 6.4.5 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.
- 6.4.6 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.
- 6.5 Treatment
- 6.5.1 Venomous snakebites are rare, and they are rarely fatal to humans. Of the 8,000 snakebite victims in the United States each year, only about 10 to 15 die. In Canada, the number of snake bites each year is very small. However, for any snakebite the best course of action is to get medical care as soon as possible.
- 6.5.2 Try to keep the snakebite victim still, as movement helps the venom spread through the body.
- 6.5.3 Keep the injured body part motionless and just below heart level.
- 6.5.4 Keep the victim warm, calm, and at rest, and transport him or her immediately to medical care.
- 6.5.5 Do not allow him to eat or drink anything.
- 6.5.6 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.
- 6.5.7 If you have a snakebite kit, wash the bite, and place the kit's suction device over the bite. (Do not suck the poison out with your mouth.) Do not remove the suction device until you reach a medical facility.
- 6.5.8 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.
- 6.5.9 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.
 - 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.





7.0 Species

7.1 Venomous Snakes in Canada

<p>Eastern Massasauga Rattlesnake (<i>Sistrurus catenatus</i>) found around Wainfleet, Windsor, Bruce Peninsula and eastern Georgian Bay in Ontario.</p>	 <p>Eastern Massasauga Rattlesnake picture by Michael Redmer/Courtesy Lincoln Park Zoo</p>
<p>Northern Pacific Rattlesnake (<i>Crotalus viridis</i>) found primarily in Okanagan and Thompson River valleys of southern British Columbia.</p>	 <p>LANCE TANNAHILL 2000</p>
<p>Prairie Rattlesnake (<i>Crotalus viridis</i>) found in south eastern Alberta, and south western Saskatchewan.</p>	

7.2 Venomous snakes in the United States

<p>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.</p>	 <p>Western Rattlesnake</p>
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<p>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.</p> <p>Species include: Sidewinder, Santa Catalina, Western, Mojave, Red Diamond, Western Diamond, Ridge Nosed, Eastern Diamondback, and Pigmy.</p>	 <p>Eastern Diamondback</p>
<p>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.</p>	
<p>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.</p>	
<p>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.</p>	 <p>Eastern Coral Snake, <i>Micrurus fulvius</i></p>

Americas

Alligators

S3NA-313-WI15

1.0 Hazard

- 1.1 Your chance of encountering an alligator is greatest during the animal's courtship and mating season, which takes place from March through September. This is when male alligators become most dominant and aggressive as they try to intimidate rival males and attract females by their show of power. Some males end up having to travel to find a mate. July through September is when mother alligators are guarding nests.
- 1.2 Mating season takes up much of the warmer months - a very popular time in the southeastern USA for outdoor activities - and alligators are solar-powered, so-to-speak. The warmth from the sun fires up their metabolism, giving them renewed energy; and renewed energy means great potential for conflict.

2.0 Encounter

- 2.1 The alligator is naturally wary of humans, and will flee quickly if you get too close to it, or it may utter a very audible and compelling warning hiss. In some cases, however, alligators may charge or attack. Here are some examples of such cases:
- 2.1.1 An alligator that is accustomed to being fed by humans may not be so shy.
- 2.1.2 An alligator that is surprised and alarmed by your approach may attack, thinking that it is being attacked itself.
- 2.1.3 A mother alligator caring for her nest or for live babies. If you see alligator babies, or if you encounter a nest (usually a mound of vegetation mixed with mud), remove yourself to a safe distance, the mother alligator is sure to be close by. If you get close, the mother may sound a very audible and intimidating warning hiss. Such a nest may be difficult to identify for a non-expert, but it is likely the mother will issue you a warning.
- 2.1.4 Alligator mothers are well-known to be practically fearless when defending their offspring, whether the little ones have hatched or not. A mother alligator was observed leaping, jaws agape, to attack a helicopter as it approached the nest area to land. The helicopter carried biologists studying alligator nests.
- 2.2 Also be careful near heavy vegetation in or near the water's edge. This is where an alligator likes to enjoy privacy and peace during the daylight hours. If you trudge through there and surprise it, the outcome may not be positive.
- 2.3 Generally, a good minimum distance to keep between you and an alligator or nest is 15 feet (4.6 meters).
- 2.4 When trying to get past an alligator, make sure not to walk between the alligator and the water, because if it's spooked, it's going to run to the water.
- 2.5 If an alligator does approach in a threatening manner, make as much noise and movement as possible. This should show the alligator that he has taken on more than he can handle and he'll back away.

**3.0 Alligator Charge**

- 3.1 The alligator is not a natural runner. Those short legs obviously don't serve it like a horse's legs do, and the alligator can actually tire out in a relatively short time. When it charges after a human or animal, it is either

trying to scare it away or seize it. It has a fast and furious burst of energy which serves it well for stealth hunting -- grabbing prey when it doesn't expect it. Furthermore, the reptile is opportunistic, which means, quite simply, it doesn't like to work very hard to get its food if it doesn't have to.

- 3.2 In the very rare event you are charged or chased by an alligator, move in as straight a line as possible away from it as fast as you reasonably can. In many cases, the vegetation features of the wild will serve to protect you by slowing the alligator down, like trees, bumps, bushes, etc. -- your comparatively long legs usually make it easier for you to maneuver through the trees and brush than an alligator's short legs do.
- 3.3 Most adult humans can outrun even a fast crocodilian, which has been clocked at a maximum of about 10 miles per hour (mph) (17 kilometers per hour [kph]), compared to a human speed of 15-17 mph (24-27 kph). But this doesn't matter much; an alligator will often give up the chase because it sees that the runner is moving away too quickly, and realizes that too much effort will be required to continue pursuit.
- 3.4 You may have heard somewhere that the zigzag run (running in a "z" pattern, side-to-side) is a good idea, but this is not only an unnecessary maneuver but probably a very unwise one. Here's why:
 - 3.4.1 Unless you're an Olympic athlete, running zigzag over natural topography increases your risk of tripping and falling over rocks, plants, roots, and the like. And it goes without saying that falling while being pursued by an alligator is not good.
 - 3.4.2 Furthermore, an alligator doesn't have the degree of stereoscopic vision we have. It actually has a small 'blind spot' directly in front of it. Hence, the alligator's vision is most effective in the 'sides' of its field of view. So, running zigzag not only slows your rate of distance from your pursuer, it may clearly indicate to the animal exactly where you are; even this point hardly matters since in many cases the alligator may keep its eyes shut while pursuing so as not to get them hit by twigs, grass stalks and branches in its path.
 - 3.4.3 Finally, an alligator bites very effectively in a side-swiping motion, so if you are trying to run zigzag and are slowed down by plants, rocks, or other obstacles, the backwards flying leg of a running human is an optimal target for side-swiping, chomping jaws (the operative word here is "side").
- 3.5 Simply put, when faced with an attack, move directly away from the alligator as quickly as possible, navigating the terrain as carefully as possible. The zigzag idea will likely not serve you well.

4.0 Alligator Attack

- 4.1 If it seizes prey, and the prey fights back hard, the alligator may release it, depending on factors such as its own size relative to that of the victim, its own level of aggression, and its measure of hunger. Merely struggling to break free may not be enough counter-aggression to stop an alligator, and may actually prompt a devastating "death roll" response, in which the reptile furiously spins on its central axis to tear muscle and bone free of the victim's body.
- 4.2 These armored saurian are among the toughest beasts in the animal kingdom, so an attack victim should channel his or her nervous energy and will to survive and take the offensive by fighting hard. Not struggling...fighting very, very, very hard. Others on hand during such an event may be able to help by fighting the reptile, too. This should include punching the snout, poking the eyes, and even jabbing the ears, which are seen as small slits behind the eyes.

5.0 Additional Resources

- 5.1 <http://www.tpwd.state.tx.us/huntwild/wild/species/alligator/index.phtml>
- 5.2 <http://corkscrew.audubon.org/Wildlife/Alligators.html>

Drilling, Boring, and Direct-Push Probing

1.0 Purpose and Scope

- 1.1 Provides procedures designed to help prevent injuries to personnel working on the project and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with drilling, boring and direct-push probing, including encountering underground utilities, subsurface installations, and potential overhead hazards.
- 1.2 Provides the minimum requirements to be followed when drilling, boring, and probing work are performed.
- 1.3 This procedure applies to all Americas-based employees and operations.
- 1.4 The **Project Manager** is responsible for meeting all the requirements in this procedure.
- 1.5 A variance provision has been included for certain requirements of this procedure found in Sections 4.3.2, 4.8.1 and 4.10. Any variance from these procedures must be approved by the **District General Manager** or the **District SH&E Manager**.
- 1.6 AECOM's clients may have specific procedures which must be followed to identify and map utility and subsurface structures on their properties or facilities. Following the client's procedures over this procedure must be approved by the **District General Manager** or the **District SH&E Manager**.

2.0 Terms and Definitions

- 2.1 **Underground Utilities** – All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling, and communications, etc.
- 2.2 **Ground Disturbance (GD)** – Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.
- 2.3 **Intrusive Activities** – Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits/trenches or other man-made cuts, cavity, trench, or depression in an earth surface formed by earth removal.
- 2.4 **Subsurface Installations** – Includes subterranean tunnels, underground parking garages, and other structures beneath the surface.

3.0 References

- 3.1 I2-141-PR1 Subs Management Procedure
- 3.2 S3NA-003-PR1 SH&E Training
- 3.3 S3NA-205-PR1 Equipment Inspections & Maintenance
- 3.4 S3NA-208-PR1 Personal Protection Equipment Program
- 3.5 S3NA-306-PR1 Highway and Road Work
- 3.6 S3NA-406-PR1 Electrical Lines, Overhead
- 3.7 S3NA-406-FM1 Overhead Electrical Lines Acknowledgement
- 3.8 S3NA-417-PR1 Underground Utilities and Subsurface Installation Clearance Process
- 3.9 S3NA-510-PR1 Hearing Conservation Program
- 3.10 Learning Management System (LMS)
- 3.11 National Groundwater Association, 2008
- 3.12 Environmental Remediation Drilling Safety Guideline

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 **Project Manager** – Initial and authorize work to proceed using the *S3NA-405-FM2 Pre-Drilling, Boring, and Direct-Push Checklist*. Authorizes (with Site Supervisor and District SH&E Manager's concurrence) if interrupted due to unexpected effect.
- 4.1.2 **District General Manager** and **District SH&E Manager** – Authorize any variances from this procedure. Authorization to proceed with drilling if interrupted due to unexpected debris or concrete.

4.2 Flow Chart/Checklist

- 4.2.1 *S3NA-405-FM1 Key Points to Know Flow Chart for Pre-Drilling, Boring, and Direct-Push Probing* is a flow chart of the key points to know of the Pre-Drilling, Boring, and Direct-push probing requirements that are addressed in this procedure. Prior to any intrusive subsurface work, the *S3NA-405-FM2 Pre-Drilling, Boring, and Direct-Push Checklist* must be filled out and signed by the **AECOM Project Manager**. If the answer to any question on the checklist is “No” or “N/A”, no ground disturbance can take place without the approval of the AECOM Project Manager. The **Project Manager** must initial the checklist to authorize this approval.

4.3 Urban (or Non-Urban Areas without a one-call system)

- 4.3.1 Be aware that in urban (i.e., city or town) areas there may be subsurface installations (e.g., underground garages) and utilities (e.g., public water, sewer, and gas pipelines) that are not covered by one-call systems. These subsurface installations and utilities require additional investigation and diligence beyond the one-call system. Additional investigation and diligence beyond the one-call system is also recommended for non-urban areas.
- 4.3.2 In urban areas, private utility locating companies must be called to identify, through geophysical surveys and other means, the presence of private utilities installed by the property owner (i.e. irrigation systems) and to verify the presence of public utilities on the properties. Hand clearing is required in urban areas. Private locates are also required in urban areas. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager**. Private locates and hand clearing is also recommended for non-urban areas.
- 4.3.3 The presence of subsurface installations and utilities requires special care when obstructions/ refusal and voids are encountered and when unexpected absence of soil recovery occurs during drilling operations. Other indicators of subsurface installations and utilities are the presence of warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill.

4.4 Permits and Access Agreements

- 4.4.1 All applicable permits (e.g., government, working near rail road, etc.) will be identified, obtained, and adhered to.
- 4.4.2 All applicable client on-site safety procedures shall be understood and adhered to, and all client permits will be obtained.
- 4.4.3 Access agreements will be obtained and adhered to as necessary.
- 4.4.4 Federal/State/Provincial/Territorial regulations that govern drill rig operations and exposed moving parts shall be adhered to.

4.5 Pre-Qualifying and Re-Qualifying Drilling Subcontractors

- 4.5.1 All drilling subcontractors will be properly pre-qualified through AECOM's Support (refer to *I2-141-PR1 Subs Management Procedure*). The qualifications of the drilling crew performing the work will be evaluated prior to each mobilization and each day by AECOM's on-site representative to assure

that their safety performance, training, qualifications, equipment, processes, and approaches reflect AECOM standards for excellence.

- 4.5.2 All drilling subcontractor equipment will be properly maintained and properly equipped, and the drilling subcontractor will verify their equipment is fully functional as a normal part of their daily and pre-work routine. Refer to *S3NA-205-PR1 Equipment Inspections & Maintenance* procedure.

4.6 General Health and Safety

- 4.6.1 Health and Safety Plan – At a minimum, a health and safety plan (HASP) that includes task hazard analyses (THAs) shall be prepared prior to any drilling, boring, and direct-push probing activities. The HASP will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions. All HASP requirements will be followed by the project team.

4.6.2 Training

- All on-site staff involved with drilling, boring, and direct-push probing activities shall be provided with on-site orientation of the drill rig and its operation.
- All on-site staff involved with drilling, boring, and direct-push probing shall be trained in identifying underground utilities and subsurface installations and the requirements.
- All operators and assistants shall have industry-standard safety training and be versed in the equipment to be utilized. This training may include, but is not limited to, HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate. All staff involved with drilling, boring and direct-push probing activities at a client site shall receive the applicable client-required training. Refer to the *S3NA-003-PR1 SH&E Training and Learning Management System (LMS)*.

- 4.6.3 Personal Protective Equipment – Refer to the *S3NA-208-PR1 Personal Protection Equipment Program* for best practices. These requirements may be modified or expanded in the HASP, which will override these requirements. Clothing shall be close fitting and comfortable without loose ends, straps, draw strings, belts, or otherwise unfastened parts that might catch on some rotating or translating component of the rig.

- 4.6.4 Hearing Conservation – Hearing conservation program requirements may apply when working around operating equipment. Refer to *S3NA-510-PR1 Hearing Conservation Program*. Each worker shall wear noise-reducing ear protectors around operating equipment or during elevated noise levels. Distance from the elevated noise level is the primary measure of control for non-essential drilling personnel.

4.7 Identification and Mapping of Utility and Subsurface Structures

- 4.7.1 The locations of subsurface and overhead utilities and subsurface installations will be investigated, documented, and shown on a site plan (a scaled site plan shall be used when feasible). Refer to *S3NA-406-PR1 Electrical Lines Overhead* and *S3NA-417 PR1 Underground Utilities and Subsurface Installation Clearance Process*.
- 4.7.2 Documentation of utility and subsurface installation clearance process (calling one call, responses from utilities) must be at the site along with the scaled site plan will be on-site at all times of intrusive activities.

4.8 Site Walk

- 4.8.1 A site walk shall be conducted by the project team/site manager with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards. If possible, particularly at urban and industrial sites, the client/property owner or someone knowledgeable about the site and site utilities will attend the site

walk. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager**.

- 4.8.2 The Site Walk is iterative with the Identification and mapping of Utility and Subsurface Structures and should be repeated as necessary following the Identification and Mapping of Utility and Subsurface Structures.
- 4.9 Proposed Subsurface Investigation Locations
- 4.9.1 All proposed subsurface locations will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.
- 4.9.2 Minimum set back distances from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.
- 4.10 Utility Clearance Investigation Location Confirmation
- 4.10.1 In urban areas, proposed subsurface locations will be hand cleared to 5 feet/1.5 meters (soil borings and wells) or 2 foot/0.6 meter (soil gas sampling probes) using non-mechanical methods (including soft dig (e.g., post hole digger, air knife, hand auger, etc.). Hand clearance should be extended if locations of deep utilities and structures are not known. In non-urban areas, hand clearing should be conducted if possible. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager**.
- 4.11 Drill Rig Inspections
- 4.11.1 All drill rigs will be inspected prior to the initiation of drilling and daily during drilling following the *S3NA-405-FM3 Daily Drill Rig Inspection Checklist*. This inspection is the responsibility of the drilling subcontractor who will provide written documentation of the inspection prior to the start of drilling each day.
- 4.12 Unanticipated Concrete/Debris or Void
- 4.12.1 If unanticipated concrete/debris is encountered and/or if a void is encountered, drilling will be immediately discontinued and the **Project Manager** notified. Drilling may only proceed with **District General Manager** or the **District SH&E Manager** approval.
- 4.13 Traffic Control
- 4.13.1 When operating near public vehicular and pedestrian traffic, the on-site personnel shall take every precaution necessary to see that the work zone is properly established, identified, and isolated from both moving traffic and passerby pedestrians (refer to *S3NA-306-PR1 Highway and Road Work*).
- 4.13.2 All traffic control devices shall be installed, placed, and maintained in accordance with a Traffic Control Plan, client specifications, and/or the Manual of Uniform Traffic Control Devices and Manual of Uniform Traffic Control Devices for Canada in Canada. Traffic control devices shall consist of and not be limited to
- Directional and informational signage;
 - High visibility barricades, cones, or barrels;
 - Lighting; and
 - Other equipment and devices as required.
- 4.14 Clearing Work Areas
- 4.14.1 In addition to any minimum requirements the drilling subcontractor may have, prior to set up, adequate site clearing and leveling shall be performed to accommodate the rig and supplies and provide a safe working area. Clearing the site includes clearing the intended drilling area of

underground utilities in accordance with *S3NA-417-PR1 Underground Utilities and Subsurface Installation Clearance Process*. Drilling or probing shall not commence when tree limbs, unstable ground, or site obstructions cause unsafe tool handling conditions.

4.15 Drilling Activities

4.15.1 In addition to any minimum requirements the drilling subcontractor may have, the following safety measures shall be taken during drilling and probing operations on site:

- The operator and helper shall be present during all active rig operations.
- Site personnel shall remain within visual contact of the rig operator.
- Hard hats, approved safety boots, safety glasses, and hearing protection shall be worn in the work zone (radius around the rig equal to the height of the drill rig mast) of a rig.
- Gas monitoring shall be conducted as appropriate.
- Hands shall be kept away from moving parts including augers.
- When observing drilling, stand upwind of the drill rig to prevent potential exposure to vapors that may be emitted from the borehole.
- The emergency shut-off switch on the rig shall be identified to site personnel and tested on a daily basis by the operator.
- Unauthorized personnel shall be kept outside of the rig work zone.
- Rig crew and other field personnel shall not use a cell phone while operating the drill rig or other equipment or within the rig work zone.
- Do not drive the rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick) look up to check for overhead obstructions. Refer to *S3NA-417-PR1 Utilities, Underground* and *S3NA-406-PR1 Electrical Lines, Overhead*.
- Before raising the mast (derrick), all rig personnel (with the exception of the operator) and visitors should be cleared from the areas immediately to the rear and the sides of the mast. All rig personnel and visitors should be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig shall be first leveled and stabilized with leveling jacks and/or solid cribbing. The drill rig shall be releveled if it settles after initial set up. Lower the mast (derrick) only when the leveling jacks are down, and do not raise the leveling jack pads until the mast (derrick) is lowered completely.
- The operator of a rig shall only operate a drill rig from the position of the controls. The rig shall not be in operation if the operator of the rig leave the area of the controls
- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line should be used.
- If it is necessary to operate the rig within an enclosed area, make certain that exhaust fumes are conducted out of the area. Exhaust fumes can be toxic and some cannot be detected by smell.
- Clean mud and grease from boots before mounting a rig platform and use hand holds and railings. Watch for slippery ground when dismounting from the platform.
- During freezing weather, do not touch any metal parts of the rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- All unattended bore holes shall be adequately covered or otherwise protected to prevent rig personnel, site visitors, or animals from stepping or falling into the hole. All open bore holes shall be covered, protected, or backfilled adequately and according to Federal/State/Provincial/Territorial or local regulations on completion of the drilling project.
- When using a ladder on a rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending and descending. Always use adequate fall protection and a full body harness when climbing above 6 feet (2 meters) of the ground. Do not attempt to use one

or both hands to carry a tool while on a ladder. Use a hoist line and a tool "bucket" or a safety hook to raise or lower hand tools.

4.16 Use of Manual Slide Hammer

4.16.1 The following health and safety procedures should be followed when using a manual slide hammer to install shallow injection points, drive point piezometers and drill tools:

- Only use a manual slide hammer that either attaches directly to the point/piezometer being driven or that incorporates a cap on the point/piezometer/drill tool that prevents the slide hammer from slipping off the point/piezometer/drill tool.
- Always grasp the slide manual slide hammer (handles if equipped with handles) with both hands while driving the point/piezometer/drill tool.
- Never allow hands or feet to get between the manual slide hammer and the drive plate or anvil.

4.17 Use of Augers

4.17.1 The following general health and safety procedures should be followed when supervising borings with continuous flight hollow-stem augers:

- Never place hands or fingers under the bottom of an auger section when it is being hoisted over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When augers are rotating, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Use a long-handled shovel to move auger cuttings away from a rotating auger. Never use your hands or feet to move cuttings away from a rotating auger.
- Do not attempt to remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.
- Loud noises may occur while driving split spoons. At minimum hearing protection shall be worn when driving split spoons.
- Keep feet clear of rope cat head rope.

4.18 Rotary, Sonic and Core Drilling

4.18.1 In addition to the health and safety procedures identified above, the following general health and safety procedures should be followed when supervising borings with rotary, sonic and core drilling:

- Drill rods should not be braked during lowering into the hole with drill rod chuck jaws. Drill rods should not be held or lowered into the hole with pipe wrenches.
- If a string of drill rods are accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your hands to clean drilling fluids from drill rods.
- When drill rods are rotating, stay clear of the rotating components of the drill rig. Never reach behind or around a rotating drill rod for any reason.
- Use a long-handled shovel to move cuttings away from the top of the borehole. Never use your hands or feet to move cuttings away from the borehole.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Keep away from area where drill rods are being moved or raised to the rig. Do not stand in the area where a drill rod will fall or slide if it should be dropped.

- Loud noises may occur during drilling. Hearing protection shall be worn.

4.19 Direct-push

4.19.1 The following general health and safety procedures should be followed when supervising drilling borings with direct-push drilling:

- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your hands to clean drilling fluids from drill rods.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

4.20 Site Movement of Equipment

4.20.1 The individual who transports a rig on and off a drilling site should:

- Be properly licensed and should only operate the vehicle according to Federal/State/Provincial/Territorial, and local regulations.
- Know the traveling height (overhead clearance), width, length and weight of the rig with carrier and know highway and bridge load, width and overhead limits, making sure these limits are not exceeded with an adequate margin.
- Allow for mast overhand when cornering or approaching other vehicles or structures.
- Be aware that the canopies of service stations and motels are often too low for a drill rig mast to clear with the mast in the travel position.
- Watch for low hanging electrical lines, particularly at the entrances to drilling sites or restaurants, motels, other commercial sites.
- Never travel on a street, road, or highway with the mast (derrick) of the rig in the raised or partially raised position.
- Remove all ignition keys if rig is left unattended unless client requirements specify that the keys remain in the ignition switch at all times.

4.20.2 Loading and Unloading

- Use ramps of adequate design that are solid and substantial enough to bear the weight of the rig with carrier, including tools.
- Load and unload on level ground.
- Use the assistance of someone on the ground as a guide.
- Check the brakes on the rig carrier before approaching loading ramps.
- Distribute the weight of the rig, carrier, and tools on the trailer so that the center of weight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the height of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.
- The rig and tools should be secured to the hauling vehicle with ties, chains, and/or load binders of adequate capacity.

4.20.3 Off-Road Movement

The following safety suggestions relate to off-road movement:

- Before moving a drill rig, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven, or hilly ground.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Use caution when traveling side-hill. Conservatively evaluate side-hill capability of drill rigs, because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill. Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Attempt to cross obstacles such as small logs and small erosion channels or ditches squarely, not at an angle.
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the drill has been moved to a new drilling site, set all brakes and/or locks. Always block/chock the wheels.

5.0 Records

5.1 None

6.0 Attachments

- 6.1 S3NA-405-WI1 Core Drilling Machine Safety Card
- 6.2 S3NA-405-FM1 Key Points to Know Flow Chart for Pre-Drilling, Boring, and Direct-Push Probing
- 6.3 S3NA-405-FM2 Pre-Drilling, Boring, and Direct-Push Checklist
- 6.4 S3NA-405-FM3 Daily Drill Rig Inspection Checklist
- 6.5 S3NA-405-ST Drilling and Boring – Jurisdictions/Regulations

Americas

Core Drilling Machine Safety Card

S3NA-405-WI1

1.0 Objective / Overview

- 1.1 Core drilling machines are used on all types of jobs. They can be electrical or gas powered and come with a stand or can be hand held. Caution should be used when operating such a machine. It may look harmless and easy to run, but drilling machines have many hazards.
- 1.2 Prior to coring activities the location should be checked for buried utilities following the Pre-Drilling, Boring and Direct-Push Checklist (S3NA-405-FM2).

2.0 Safe Operating Guidelines

- 2.1 Clean the flanges before mounting the blade.
- 2.2 Make sure the blade is correct for the material being cut and that the arrow on the blade corresponds with the direction of rotation of the machine spindle.
- 2.3 Avoid tilting the blade when cutting.
- 2.4 Use only the machines that have an approved safety guard.
- 2.5 Remove the diamond blade from the machine during transit to prevent accidental damage.
- 2.6 Inspect the blades frequently to detect cracks or undercutting of the steel center.
- 2.7 Don't let excessive heat be generated at the cutting edge of the blade.
- 2.8 Use adequate water supply to both sides of the blade.
- 2.9 Follow the manufacturers recommended pulley sizes and operating speeds for specific blade diameters.
- 2.10 Make sure to tighten drive belts to ensure full available power.
- 2.11 Don't force the blade on the blade shaft or mount blade on an undersized spindle.

3.0 Potential Hazards

- 3.1 Utilities
- 3.2 Electrical shock
- 3.3 Flying debris
- 3.4 Severe cuts
- 3.5 Hearing loss
- 3.6 Breathing fumes or dust
- 3.7 Binding/biting – torque control

4.0 Training Requirements

- 4.1 Review of Applicable SOPs (e.g., *S3NA-305-PR1 Hand and Power Tools*; *S3NA-302-PR1 Electrical, General*).
- 4.2 Demonstrated knowledge on the use of a coring machine.
- 4.3 Review and follow manufacturers' operating guidelines.



5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves
- 5.2 Face shield
- 5.3 Steel-toed/composite-toed boots
- 5.4 Hearing protection
- 5.5 Respirator or dust mask

6.0 Other Safety Tips

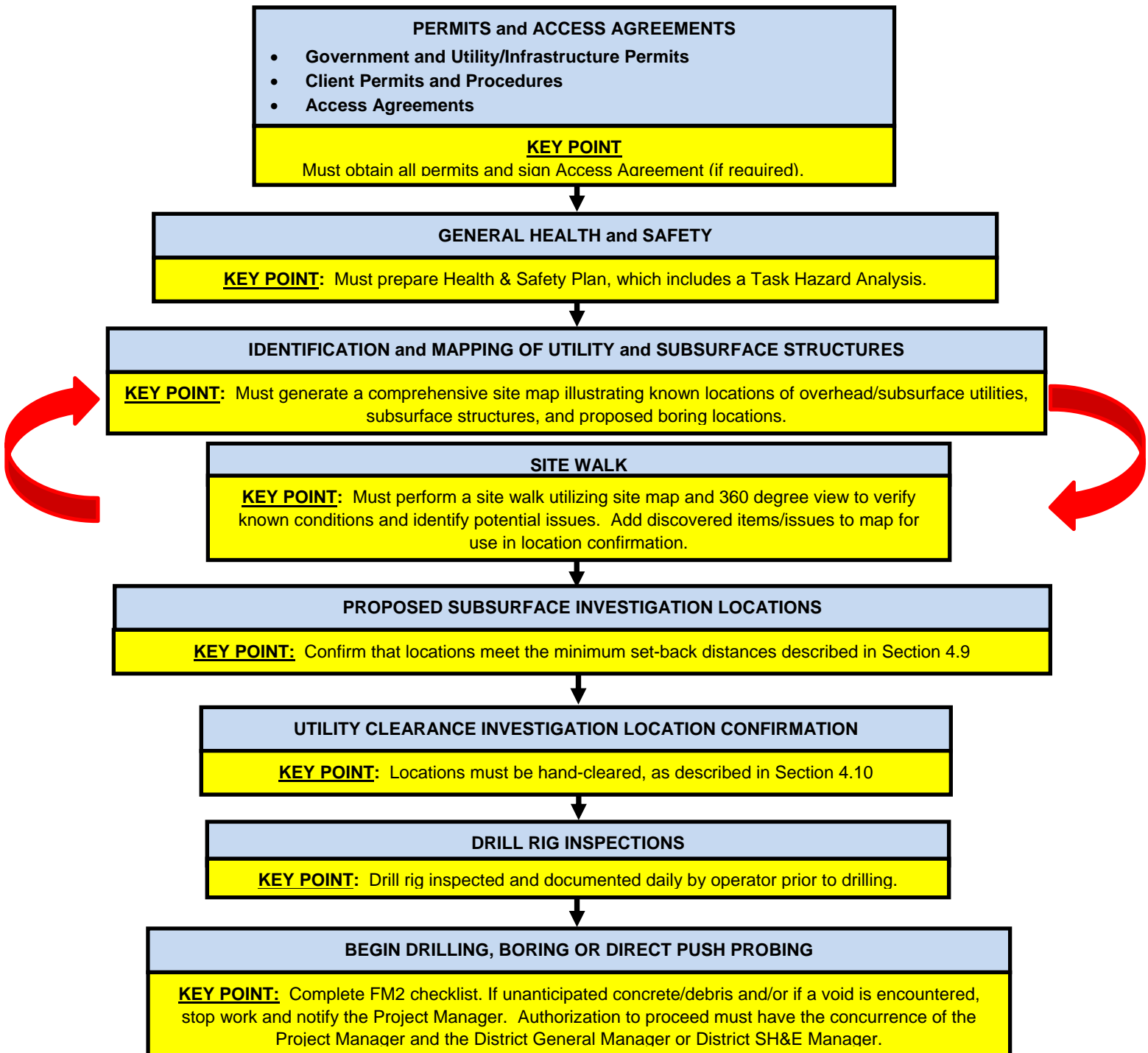
- 6.1 Keep fingers and hands away from the cutting edge.
- 6.2 Hold handle firmly when operating.
- 6.3 A subsurface utility clearance should be performed prior to initiating drilling operations.
- 6.4 Stand firmly and apply body weight at anchored side of guarded platform.

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Key Points to Know Flow Chart for Pre-Drilling, Boring and Direct Push-Probing Requirements

S3NA-405-FM1

Before Any Drilling, Boring and Direct Push Probing Activities



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Pre-Drilling, Boring and Direct-Push Checklist

S3NA-405-FM2

Location:		Project #:	
Contractor:		Client:	
Date:	Time:	Weather:	
Inspector:		Project Manager:	

Notes:

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.

Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

	Yes	No	N/A
I. Permits and Access Agreements			
1. Have all appropriate permits been identified and obtained (e.g., drilling, encroachment, working near railroads, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Have all client requirements, including client permits been identified and obtained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. If working off-site is(are) site access agreement(s) executed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
II. General Health and Safety			
1. Has a Health and Safety Plan been prepared for AECOM employees?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Do on-site personnel have required-level PPE?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Do on-site personnel have required-level of training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Are appropriate monitoring equipment as specified in the HASP/THAs available at each drill rig location?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Has the field screening equipment been calibrated as required by the HASP?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Are calibration gases available at the site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Does each drill rig have a fire extinguisher, absorbent materials to cleanup a spill, and a first aid kit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
III. Identification and Mapping of Utility and Subsurface Structures			
1. Is a Site Plan showing the proposed subsurface locations and utility locations attached to this check list?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Have utilities and subsurface installations been investigated as being present, including the following:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Steam, gas and electric?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Sewer and water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Subterranean tunnels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Fiber optics (Note routine utility geophysical survey will not identify fiber optic cables)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Traffic control cables?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Others (identify)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<p>Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.</p> <p>Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.</p>			
	Yes	No	N/A
3. Have all Federal/State/Provincial/Territorial and other "One Call" providers marked their facilities or otherwise notified they do not have any facilities near the proposed subsurface/intrusive locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Has the Federal/State/Provincial/Territorial or other "One Call" provider identified what utilities and underground structures are <u>not</u> included in their provider system (e.g., non-utility underground structures)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. As noted in the exception at the bottom of Section VI of this checklist, has a utility locating contractor performed geophysical and/or other surveys of the proposed subsurface/intrusive locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were all circuits on during subsurface checks if the checks were for identifying energized lines (e.g., circuits on timers or light sensing switches)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. If overhead utilities or obstructions are present that may prevent the safe operation of drilling/excavation equipment, has the AECOM Overhead Electrical Line Acknowledgement Form been signed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Was there visual verification that each of the proposed locations does not lie on a line connecting two similar manhole covers (e.g., sanitary sewer or storm drain)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was there visual verification that the ground in the vicinity of each of the proposed subsurface locations has not subsided, been excavated and patched, give the appearance it may be covering a former trench (e.g., linear cracks, sagging curbs, linear re-pavements) and do not lie on a line with any water, gas, electrical meters, utility cleanouts, or other utility boxes in the surrounding areas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IV. Site Walk			
1. Has a site walk been performed that includes the following:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Reviewing all planned intrusive locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Adjusting locations away from subsurface utilities and installations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Determining the appropriate utility clearance activities for each location?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Determining the presence and location of overhead utilities and obstructions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Walk around perimeter of the site to observe physical hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Walk around 50 feet (15 meters) from perimeter of the site to observe physical hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Walk around 50 feet (15 meters) radius from each proposed subsurface intrusion location?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V. Proposed Subsurface Investigation Locations*			
1. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are all of the proposed subsurface locations at least 7 feet (2.1 meters) from the pad surrounding any underground storage tanks (USTs) shown on the Site Plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utilities shown on the Public Right-of-Way street improvements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Are all proposed subsurface locations requiring a drill rig for installation at least 10 feet (3 meters) from any energized overhead power line (or further based on line voltage)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.

Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

	Yes	No	N/A
5. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utilities identified during any geophysical survey performed using ground-penetrating radar (GPR) in conjunction with other technology?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.

VI. Utility Clearance Investigation Location Confirmation*

1. Have subsurface locations been hand cleared as follows? Hand clearance should be extended if locations of deep utilities and structures are not known. In non-urban areas hand clearing should be conducted if possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. For soil borings/monitoring wells excavate to a minimum of 5 feet (1.5 meters) below ground surface using non-mechanical methods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. For soil gas sampling excavated to 2 foot (0.6 meter) below grade or below the bottom of a concrete floor prior to the installation of soil gas sample probe points?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Exceptions to requirements of the utility clearance process include the following:

- Sites where extensive utility mapping has been completed and/or where extensive activities have already been performed.
- Locations where facility layout is well documented and understood.
- Sites or portions of large sites where utilities are known not to exist currently or to not have ever existed throughout the life of the facility, property or site.

VII. Drill Rig Inspections

1. Structural Damage, Loose Bolts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ropes / Cables show no signs of faying, kinking, excessive ware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Loose or Missing Guards, Fluid Leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Damaged Hoses and/or Damaged Pressure Gauges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Tires / Tracks in good condition. Inflated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Check and test all safety devices such as:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Emergency shutdown switches, at least daily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. All gauges and warning lights, and ensure control levers are functioning properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. First aid and fire extinguishers on drill rig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Back up alarm functioning properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Suitable storage for tools, materials, and supplies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Pipes, drill rods, casing, and augers stacked on racks to prevent rolling and sliding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Platforms and other work areas free of debris materials and obstructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Parts / platforms, derrick can move freely with no obstructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Americas

Daily Drill Rig Inspection Checklist

S3NA-405-FM3

Location:		Project #:	
Contractor:		Client:	
Date:	Time:	Weather:	
Contractor Signature:		Project Manager:	

This form is to be filled out and signed by the drilling subcontractor.

	Yes	No
I. General Safety		
Safety Officer Designated for Job:	<input type="checkbox"/>	<input type="checkbox"/>
Name:		
Safety Meeting Performed (Daily)	<input type="checkbox"/>	<input type="checkbox"/>
II. Drill Rig Inspection		
Structural Damage, Loose Bolts	<input type="checkbox"/>	<input type="checkbox"/>
Loose or Missing Guards, Fluid Leaks	<input type="checkbox"/>	<input type="checkbox"/>
Ropes / Cables show no signs of faying, kinking, excessive ware	<input type="checkbox"/>	<input type="checkbox"/>
Damaged Hoses and/or Damaged Pressure Gauges	<input type="checkbox"/>	<input type="checkbox"/>
Tires / Tracks in good condition. Inflated	<input type="checkbox"/>	<input type="checkbox"/>
Check and test all safety devices such as:		
Emergency shutdown switches, at least daily	<input type="checkbox"/>	<input type="checkbox"/>
All gauges and warning lights, and ensure control levers are functioning properly	<input type="checkbox"/>	<input type="checkbox"/>
First aid and fire extinguishers on drill rig	<input type="checkbox"/>	<input type="checkbox"/>
Back up alarm functioning properly	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
III. Drilling Operations		
Mast or derrick down when moving rig	<input type="checkbox"/>	<input type="checkbox"/>
Overhead obstructions identified before mast is raised	<input type="checkbox"/>	<input type="checkbox"/>
Drill rig stabilized using leveling jacks or solid cribbing	<input type="checkbox"/>	<input type="checkbox"/>
Secure and lock derrick	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
IV. Wire Line Hoists, Wire Rope, and Hardware		
Inspection for broken wires where reduction in rope diameter, wire diameter, fatigue, corrosion, damage from gear jamming, crushing, bird caging, kinking	<input type="checkbox"/>	<input type="checkbox"/>
Inspect and lubricate parts daily	<input type="checkbox"/>	<input type="checkbox"/>

Key Drilling and Boring – Jurisdictions/Regulations

Jurisdiction	Regulation
United States	
OSHA	29 CFR 1910.212
Canada	
Alberta	OHS Code (2014) Part 37, 756 – 779
British Columbia	OHS Regulation (WorkSafeBC – 2013) Part 8.2 – 8.10, Part 12.84 – Part 12.92
Manitoba	Workplace Health and Safety Regulation (217/2006) Part 41.1 – 41.22
New Brunswick	OHS Regulation (91-191) Sect 38, 237, 241, 242,243
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 52, 61, 68, 71, 73, 151.4, 151.5, 151.6, 163, 164, 166, 167
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 9, 87, 88
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 39, 97, 141, 220
Ontario	O. Reg 245/97 – Exploration, Drilling and Production Ontario Water Resources Act: O. Reg 903 – Wells
Prince Edward Island	OHS Regulations (EC180/87) Sect 30.2, 30.8, 31.1, 45.1
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 340 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 2.10.2, 3.10.13, 3.15.9, 4.5, 8.5
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Part 29, 410 – 439
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Part 1.08 – 1.21, Part 14.34 – 14.38, Part 17.21 – 17.61

Electrical Lines, Overhead

1.0 Purpose and Scope

- 1.1 Provides the safe work requirements to be observed where overhead electrical lines, electrical apparatus, or any energized (exposed or insulated) parts are present at a job site.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations, except where local or governmental regulations are more stringent.

2.0 Terms and Definitions

- 2.1 **Arc Flash Hazard** – A dangerous condition associated with the possible release of energy caused by and electric arc. Arc flash is the light and heat produced from an electric arc supplied with sufficient electrical energy to cause substantial damage, harm, fire, or injury.
- 2.2 **Electrical Hazard** – A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.
- 2.3 **Minimum Approach Distance (M.A.D.)** – The M.A.D. is the closest distance any employee or any part of the operating equipment is permitted to approach an energized or a grounded object.
- 2.4 **Qualified Person (Electrical Transmission and Distribution)** – A person trained and knowledgeable in the construction and operation of electrical transmission and distribution equipment or a specific work method, and has been trained to recognize and avoid electrical hazards that might be present with respect to that equipment or work method.
- 2.5 **Types of Overhead Lines:**
 - Overhead electrical lines
 - Structural cable supports
 - Guy wires
 - Cable television / communication lines

3.0 References

- 3.1 29 CFR 1926 Subpart CC, "Cranes & Derricks in Construction"
- 3.2 29 CFR 1926 Subpart V, "Power Transmission and Distribution"
- 3.3 29 CFR 1926.453, "Aerial Lifts"
- 3.4 American National Standards Institute (ANSI) A92 Series, "Elevating and Vehicle Lift Devices"
- 3.5 ANSI B30.5, "Mobile and Locomotive Cranes"
- 3.6 [Learning Management System \(LMS\)](#)
- 3.7 National Fire Protection Agency (NFPA) 70E, "Standard for Electrical Safety in the Work Place"
- 3.8 I2-141-PR1 Subs Management Procedure
- 3.9 S3NA-004 PR1 Incident Reporting
- 3.10 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.11 S3NA-302-PR1 Electrical, General

4.0 Procedure

4.1 Roles & Responsibilities

4.1.1 Project Manager

- Identify conditions where overhead electrical lines may be present and outline what is required in the task hazard analysis or safety plan refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning*.
- Coordinate and communicate with subcontractors or employees working around overhead electrical lines, refer to *I2-141-PR1 Subs Management Procedure*.
- Confirm the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement form* is completed by anyone working around overhead electrical lines on the project site.

4.1.2 SH&E Department

- Assist and support the Project Manager in planning and responding to concerns regarding the exposure to overhead electrical lines.

4.1.3 Employees

- Inform the Project Manager of field conditions that may expose risks to overhead electrical lines.

4.1.4 Overhead line Owner/Operator

- Complete the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement* and submit to AECOM prior to performing work.

4.2 Training

4.2.1 **Project Managers** shall ensure that each equipment operator and crew member assigned to work with the equipment is trained in accordance with the *S3NA-209-PR1 Project Hazard Assessment and Planning* for specific required training assigned in the LMS. Additional training requirements include:

- Overhead lines are presumed to be energized unless the utility **overhead line owner/operator** confirms that the overhead line has been and continues to be de-energized and visibly grounded at the worksite.
- Overhead lines are presumed to be uninsulated unless the utility **overhead line owner/operator** or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution confirms that a line is insulated.
- The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.
- Follow the *S3NA-302-PR1 Electrical, General* procedures to properly ground equipment and the limitations of grounding.

4.3 General Requirements

4.3.1 **Project Managers** must contact the overhead owner/operator (i.e. local utility company) before work is done or before equipment is operated within 50 feet (15.25 meters) of an energized overhead line, to determine the voltage of the overhead line and establish the appropriate M.A.D. The Minimum Approach Distance vs Voltage varies from Province to Province in Canada. The minimum approach distance or the regulatory minimum distance requirements, whichever is more stringent, must be maintained. Figure 4-1 lists the Phase-to-Phase voltage rating voltages in kilovolts and the M.A.D.s applicable to all AECOM operations:

Figure 4-1: Minimum Approach Distances (M.A.D.)

Voltage Range (Kilovolts) (Phase-to-Phase)	Minimum Approach Distance (M.A.D.) in Feet (Meters)
Personnel must allow for equipment movement and electrical line swaying when establishing a M.A.D.	
0 – 50 KV	10 (3)
Over 50 – 200 KV	15 (5)
Over 200 – 350 KV	20 (6)
Over 350 – 500 KV	25 (8)
Over 500 – 750 KV	35 (11)
Over 750 – 1,000 KV	45 (14)
<p>Note: This requirement shall apply except where client, local, or governmental regulations are more stringent.</p>	

Source: American National Standards Institute, Publication B30.5.

- 4.3.2 An appropriate distance must be kept between equipment, its occupants, their tools and energized overhead lines, electrical apparatus, or any energized parts.
- 4.3.3 These minimum approach distances do not apply to a load, equipment, or building that is transported under energized overhead power lines if the total height, including equipment transporting it, is less than 13.5 feet (4.15 meters).
- 4.3.4 **Project Managers** or designated employees must formally notify (using the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement form*) all subcontractors or equipment operators of an energized overhead line before work is done or equipment is operated in the vicinity of the overhead line at distances less than 50 feet (15.25 meters) and obtain the operator's assistance in protecting workers involved. **Project Managers** must formally notify all subcontractors of overhead lines with the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement form*.
- 4.3.5 **Employees** must not place earth or other material under or beside an overhead line if doing so reduces the safe clearance to less than 50 feet (15.25 meters). To maintain a safe distance of 50 feet (15.25 meters):
 - Install warning devices and signs (hang a sign from and mark all guy wires to warn traffic of low clearance; provide warning signage for all overhead services).
 - Install telescopic, nonconductive posts and flagging across right-of-way at the minimum allowable clearance as allowed by regulations for the line voltage.
 - Position signs or other devices to determine the "Danger Zone."
 - Inform all job site personnel of the danger zone and the safe distances required.
 - Beware of atmospheric conditions, such as temperature, humidity, and wind that may dictate more stringent safety procedures.
- 4.3.6 Operation of heavy equipment and cranes in areas with overhead lines represents a significant arc flash and electrical hazard to all personnel on the job site. Accidental contact with an energized overhead line or arcing between a high power line and grounded equipment, can cause harm to nearby equipment operators or ground personnel and damage to power transmission systems and/or operating equipment.

- 4.3.7 Although maintaining a safe distance from all energized overhead lines is the preferred means for control of this hazard, this may not always be feasible due to site conditions. If work will (or may) occur within 50 feet (15.25 meters) of any energized conductor, the procedures outlined below will be observed:
- 4.3.7.1 Overhead electrical lines will be identified on each job site before the work commences. For each identified line, the **Project Manager** must determine whether it is energized (and the operating voltage for energized lines), and whether work operations will require that activities with heavy equipment (excavators, loaders, cranes, aerial work platforms, etc.) will occur within 50 feet (15.25 meters) of the line.
 - 4.3.7.2 Job site personnel must maintain a clearance of at least 10 feet (3 meters) between any part of the operating equipment, its occupants and their tools from any overhead line carrying up to 50,000 volts.
 - 4.3.7.3 One foot (0.3 meters) additional clearance is required for every additional 30,000 volts or less.
 - 4.3.7.4 If equipment operation must take place within 50 feet (15 meters), a signal person must be used with clear view of the overhead utility & the equipment operator.
- 4.4 Minimum Approach Distance Reduction
- 4.4.1 Where any work task will not allow the minimum safe working distance to be maintained, an alternate means of protection must be implemented by the **Project Manager** and approved by the **Safety, Health and Environment (SH&E) Department**. In order of preference, acceptable procedures are:
- De-energize the overhead line(s)/lockout by local utility authorities; or
 - Implement alternative procedures as identified by the **overhead line owner/operator** or a registered professional engineer.
- 4.4.2 De-energize Overhead Lines
- Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site overhead lines are often under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the **overhead line owner/operator**. De-energizing of an overhead line often requires advance coordination with the **overhead line owner/operator**. At least one week advance notice should be provided.
 - **Project Managers** must confirm with the utility **overhead line owner/operator** that the overhead line has been de-energized and visibly grounded at the job site.
- 4.4.3 Alternative Procedures
- **Project Managers** may implement alternative procedures to prevent arc flash and electrical contact. These procedures must be identified by the **overhead line owner/operator** or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution.
 - A planning meeting with the **Project Manager**, **SH&E Department** and the **overhead line owner/operator** (or registered Professional Engineer) must be held to determine the most effective alternative procedures.
 - Alternative procedures shall meet all client, local and governmental regulatory requirements.
 - Insulating Barriers must be rated for the voltage line being guarded. These barriers may not be part of or attached to the equipment. The M.A.D. shall only be reduced within the designed working dimensions of the insulating barrier. This determination shall be made by a Qualified

Person in accordance with local or governmental requirements for work practices near energized equipment.

- Dedicated Line Spotters must be trained to enable them to effectively perform their task, including training on the applicable local and governmental regulations.

4.5 Additional Safety Measures

4.5.1 The following additional safety measures shall be implemented as needed when working around energized power lines:

- Provide equipment with proximity warning devices. These provide an audible alarm if any part of the equipment gets too close to a line.
- Install ground safety stops. These prevent vehicles from accidentally entering hazardous areas.
- Equip cranes with a boom-cage guard. This prevents the boom from becoming energized if an electrical line is contacted.
- Utilize insulated links and polypropylene tag lines. These prevent the transmission of electricity to loads or tag line handlers if an electrical line is contacted.

NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the procedures in Section 4.1.

4.6 Emergency Planning

4.6.1 **Project Managers** shall complete a site-specific emergency plan as part of their project safety plan or task hazard analysis for all operations during which equipment is operated within 50 feet (15.25 meters) of an energized overhead power line or conductor. This plan shall identify the following information:

- The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.
- The safest means of evacuating from equipment that may be energized.
- The potentially energized zone around the equipment.
- The need for crew in the area to avoid approaching or touching the equipment and the load.
- The means to de-energize the power line or live conductor.
- The contact information for the utility **overhead line owner/operator** and emergency services.
- In the event of an incident, the **employee** must report it in accordance with *S3NA-004 PR1 Incident Reporting*.

5.0 Records

5.1 Retain the Overhead Electrical Lines Acknowledgement forms in the project files.

6.0 Attachments

6.1 S3NA-406-FM1 Overhead Electrical Lines Acknowledgement Form

Americas

Overhead Electrical Lines Acknowledgment

S3NA-406-FM1

Company information		
Name of Employer or Contracting Operation:		
Address:		
City:	Province:	Postal Code:
Telephone:	Fax:	
Project Name:		
AECOM Contact Name:		
Acknowledgement		
I acknowledge that I have received a copy of <i>S3NA-406-PR1 Electrical Lines, Overhead</i> , I understand that this project site may have Overhead Electrical Hazards, and I have discussed this procedure with all of our company staff who will be on this site.		
Name and Title (Print)	Signature	Date

Hazardous Materials Communication/WHMIS

1.0 Purpose and Scope

- 1.1 Provides a Hazard Communication Program so that AECOM employees are informed of the hazards of the chemicals to which they may be exposed in the course of their work by way of container labeling and other forms of warning, safety data sheets (SDS), and employee training.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.
- 1.3 The program applies to the use of any hazardous substances which are known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

2.0 Terms and Definitions

- 2.1 **Acute Effect** – An adverse effect on the human body with immediate onset of symptoms.
- 2.2 **Article** – A manufactured item: (1) which is formed to a specific shape or design during manufacture; (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and, (3) which does not release or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.
- 2.3 **Carcinogen** – Those chemicals appearing in any of the following reference sources are established as carcinogens for hazard communication purposes:
 - National Toxicology Program (NTP) Annual Report on Carcinogens.
 - International Agency for Research on Cancer (IARC) Monographs, Volumes 1-34. Note: The Registry of Toxic Effects of Chemical Substances published by NIOSH indicates whether a substance has been found by NTP or IARC to be a potential carcinogen.
- 2.4 **Chemical Name** – The scientific designation of a substance in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry or the system developed by the Chemical Abstracts Service.
- 2.5 **Chronic Effect** – An adverse effect on the human body with symptoms which develop slowly over a long period of time or which frequently recur.
- 2.6 **Combustible Liquid** – Any liquid having a flash point at or above 100°F (37.8°C) but below 200°F (93.3°C), except any mixture having components with flash points of 200°F (93.3°C), or higher, the total volume of which makes up 99% or more of the total volume of the mixture.
- 2.7 **Common Name** – Any designation or identification such as code name, code number, trade name or brand name used to identify a substance other than by its chemical name.
- 2.8 **Container** – Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank or the like that contains a hazardous chemical. For purposes of this Safety Operating Procedure (SOP) and Occupational Safety and Health Administration (OSHA) standard, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.
- 2.9 **Establishment** – Any separate and distinct AECOM office, laboratory or other company facility.
- 2.10 **Exposure** – Any situation arising from work operations where an employee may ingest, inhale, absorb through the skin or eyes or otherwise come into contact with a hazardous substance.
- 2.11 **Flammable** – A substance that falls into one of the following categories:

- 2.11.1 **Flammable Aerosol** – An aerosol that when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening or flashback (a flame extending back to the valve) at any degree of valve opening;
- 2.11.2 **Flammable Gas** – A gas that at ambient temperature and pressure:
- Forms a flammable mixture with air at a concentration of 13% of volume or less; or
 - Forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit.
- 2.11.3 **Flammable Liquid** – Any liquid having a flash point below 100°F (37.8°C), except any mixture having components with flash points of 100°F (37.8°C) or higher, the total of which make up 99% or more of the total volume of the mixture.
- 2.11.4 **Flammable Solid** – A solid, other than a blasting agent or explosive as defined in 8 CCR 5237(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change or retained heat from manufacturing or processing or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.
- A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.
- 2.12 **Flash Point** – Minimum temperature of a liquid at which it gives off sufficient vapors to form an ignitable mixture with the air near the surface of the liquid or within the container used.
- 2.13 **Hazardous Chemical** – Those chemicals appearing in any of the following reference sources are established as hazardous chemicals for hazard communication purposes.
- 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, OSHA.
 - Hazardous Products Act, R.C.S. 1985, c. H-3, section 2, Canada.
 - For operations within the state of California, the list of hazardous substances prepared by the California Director of Industrial Relations pursuant to Labor Code Section 6382. The concentrations and footnotes, which are applicable to the list, shall be understood to modify the same substance on all other source lists or hazard determinations set forth in § 8 CCR 5194(d)(3)(B) and (d)(5)(D).
- 2.14 **Hazardous Substance** – A hazardous chemical or carcinogen, or a product or mixture containing a hazardous chemical or carcinogen provided that:
- 2.14.1 The hazardous chemical is 1% or more of the mixture or product or 2% if the hazardous chemical exists as an impurity in the mixture; or
- 2.14.2 The carcinogen is 0.1% or more of the mixture or product;
- 2.14.3 Manufacturers, importers and distributors will be relied upon to perform the appropriate hazard determination for the substances they produce or sell.
- 2.14.4 The following materials are not covered by the Hazard Communication Standard:
- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 USC 6901 et seq.) when subject to regulations issued under that act by the Environmental Protection Agency.
 - Tobacco or tobacco products;
 - Wood or wood products. Note: Wood dust is not exempt since the hazards of wood dust are not “self-evident” as are the hazards of wood or wood products;
 - Consumer products (including pens, pencils, adhesive tape) used in the work place under typical consumer usage;
 - Articles (i.e. plastic chairs);
 - Foods, drugs, or cosmetics intended for personal consumption by employees while in the work place;

- Foods, drugs, cosmetics in retail store packaged for retail sale; and
 - Any drug in solid form used for direct administration to the patient (i.e., tablets or pills).
- 2.15 **Hazardous Substance Inventory (HSI) / WHMIS Log** – A listing of all chemicals stored or used at an office or project site. Note that the list may be imbedded in a project Health and Safety Plan.
- 2.16 **Immediate Use** – Means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
- 2.17 **SDS** – A Safety Data Sheet prepared pursuant to state and federal regulations, OSHA Form 174 and Canada regulations (Controlled Products regulations, schedule 1).
- 2.18 **SDS Administrator** – The individual or group designated by the Office Manager (Operations) or Project Manager to maintain the establishment-specific inventory list or log and the SDS binder required if that establishment uses or stores hazardous substances.
- 2.19 **NFPA** – A system of categories, colors and numbers was created to provide basic hazard information. It enables firefighters and other emergency personnel to easily decide whether or not to evacuate an area or proceed with emergency control operations. The three principal categories of identification are Health, Flammability and Instability. A numerical range of “0 to 4” indicates the severity of the hazard. A “4” indicates the most severe and a “0” indicates a minimal hazard.
- 2.20 **Mixture** – Any solution or intimate admixture of two or more substances which do not react chemically with each other.
- 2.21 **Reactivity** – A measure of the tendency of a substance to undergo chemical reaction with the release of energy.
- 2.22 **Solubility** – The ability of substance to blend and mix uniformly with another.
- 2.23 **Specific Gravity (density)** – Ratio of the weight of a substance to the weight of the same volume of another substance. As used in this directive, specific gravity or density refers to the weight of substance as compared to the weight of an equal volume of water.
- 2.24 **Vapor Density** – The weight of a vapor-air mixture resulting from the vaporization of a volatile liquid at equilibrium temperature and pressure conditions, as compared with the weight of an equal volume of air under the same conditions.
- 2.25 **WHMIS** – The Workplace Hazardous Materials Information System (WHMIS) is Canada's national hazard communication standard. The key elements of the system are cautionary labeling of containers of WHMIS "controlled products", the provision of material safety data sheets (SDSs) and worker education and training programs.

3.0 References

- 3.1 Additional definitions can be found in the Hazardous Material Regulations (HMR), the Transportation of Dangerous Goods (TDG) Regulations, and the International Air Transport Association (IATA) Dangerous Goods Regulation (DGR)
- 3.2 S3NA-003-PR1 SH&E Training
- 3.3 S3NA-208-PR1 Personal Protective Equipment Program
- 3.4 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.5 S3NA-509-PR1 Hazardous Waste Operations and Emergency Response

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Region SH&E Manager / SH&E Department

- Audit their regional offices to assure that they maintain an establishment-specific Hazardous Substance Inventory (HSI).
- Audit their regional offices to assure that if an establishment-specific HSI is required, that SDSs are available for each substance listed on the HSI.
- Provide interpretation of SDSs and hazard information for WHMIS labels/NFPA labels and other information to assist in training employees.
- Provide hazard communication training to AECOM employees and file documents of this training.
- Review SDS for adequacy of completion to meet the OSHA and Canadian standard and returning them to supplier, if necessary.

4.1.2 Project Manager / Site Safety Officer (SSO)

- Access or obtain, and maintain copies of SDS from:
 - All AECOM subcontractors bringing chemicals onto the project site; and
 - The client, for all of the client's chemicals to which AECOM or AECOM subcontract employees are potentially exposed.

4.1.3 Office Manager (Operations)

- Have an operations-specific, written hazard communication program which at least describes how the requirements of this Procedure and the US OSHA and Canadian Hazard Communication requirements for labels and other forms of warning, material safety data sheets, and employee information and training will be met.
- Appoint an SDS administrator for their establishment if they store or use hazardous substances.
- Confirm, if required, that the SDS Administrator maintains an HSI for their establishment.
- Confirm that SDS are available for all substances listed on their establishment's HSI.
- Confirm that a copy of this Procedure and the site-specific SDS are available to all employees. Employees shall be instructed in the location of this Procedure and the SDS.
- Confirm that all employees in their office affected by the HAZCOM standard are provided with the appropriate training, including new employees.

4.1.4 Supervisor

- Confirm that all employees under their supervision have received the initial and periodic training required by this SOP prior to assigning employees to tasks involve the use of, or potential exposure to, hazardous substances.
- Notify employees of hazardous substances covered by this SOP that are used in their work area.
- Determine the potential fire, toxic, or reactivity hazards which are likely to be encountered in the handling or utilization of a hazardous substance and will communicate this information to their affected employees, before any are permitted to work with it.
- Confirm that an SDS is available for each hazardous substance used, or potentially encountered, in the work areas or on the projects that are under their supervision.
- Notify subcontractors (working for AECOM) of any hazardous substances that are used or stored by AECOM to which the subcontractor's employees may be exposed.

- Notify clients or property owner/operators of chemicals brought onto their property by AECOM or AECOM's subcontractors.
- Request SDSs from all subcontractor organization for the relevant chemicals they bring onto an AECOM controlled site.

4.1.5 Employee

- Confirm that they have received appropriate hazard communication training prior to working with materials that fall under the standard.
- Only work with materials for which they have been instructed on how to find an SDS and how to work with that material safely.
- Provide a copy of all SDSs received to the SDS Administrator at their facility.
- Verify that an SDS is available in their work area for each hazardous substance that they use.

4.2 General Procedure

- 4.2.1 Confirm that containers of hazardous substances that they use are properly labelled. All employees have a right to, and should, know the properties and potential hazards of substances to which they may be exposed.
- 4.2.2 Should AECOM assign employees that do not read and speak English to tasks with chemical exposures, communications will be provided in the language understood by that employee.

4.3 Employee Information and Training

- 4.3.1 Each AECOM employee who handles or is exposed to hazardous substances must be provided information and training, refer to *S3NA-003-PR1 SH&E Training*, on hazardous substances in their work area:
- At the time of their initial assignment; and
 - Whenever a new hazard is introduced into their work area.
- 4.3.2 As a minimum, the training requirements apply to employees in the following job categories:
- All employees who perform field work that involves the use of, or potential exposure to, hazardous substances; and
 - Laboratory Employees.
- 4.3.3 The Initial Training will provide instruction in the following:
- Methods and observations that may be used to detect the presence or release of a hazardous substance in the work area (such as personal monitoring, visual appearance or odor of hazardous substances being released, etc.);
 - The physical and health hazards of substances in the work area and measures and procedures AECOM has implemented to protect employees; and
 - The details of this hazard communication program (SOP), including an explanation of the labelling system and the SDS, and how he/she can obtain and use appropriate hazard information.
 - Any operations in their work area in which hazardous substances are present;
 - Location and availability of this written hazard communications program (SOP);
 - Their right to personally receive information regarding hazardous substances to which they may be exposed;
 - Their right to have their physician receive information regarding hazardous substances to which they may be exposed; and

- Their right against discharge or other discrimination (in California) due to the employee's exercise of rights afforded pursuant to provisions of the California Hazardous Substances Information and Training Act.

4.3.4 Periodic Training and Training for Non-Routine Tasks

Additional training will be provided to employees who have received initial training whenever:

- A new hazardous substance is introduced into their work area;
- A new or revised SDS is received, which indicates significantly increased risks to employee health as compared to those stated on the previous SDS; and
- Non-routine tasks are performed, which will potentially result in exposure to hazardous substances, or exposure under circumstances, which were not addressed during initial training.

Supervisors, in coordination with their **Region SH&E Manager**, shall provide such training through an explanation of the information on the contents of the SDS for that substance.

When training their employees, supervisors shall explain:

- Any health hazards associated with use of the substance or mixture;
- Proper precautions for handling;
- Necessary personal protective equipment or other safety precautions to prevent or minimize exposure; and
- Emergency procedures for spills, fire, disposal, and first aid.

For most projects involving field work, this periodic training requirement will be facilitated through the implementation of the site specific HASP that has been developed for the project.

4.3.5 Documentation of Initial and Periodic Training

- All training required shall be documented at the time it is performed by having the employee sign a copy of a training attendance sheet.

4.4 Hazardous Waste Exemption

4.4.1 In the U.S., hazardous wastes are excluded from the state and federal Hazard Communication standards. AECOM employees who handle or are otherwise exposed to hazardous wastes are covered by the requirements of the Resource Conservation and Recovery Act (RCRA) and other local waste related laws and regulations and the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 and *S3NA-509-PR1 Hazardous Waste Operations and Emergency Response*.

4.5 Hazardous Substance Inventory and Chemical Usage

Establishment of a Specific Hazardous Substance Inventory (HSI) or WHMIS Log, as referenced or contained within the safe to work plan, refer *S3NA-209-PR1 Project Hazard Assessment and Planning*, shall include:

- If an AECOM establishment uses or stores additional hazardous substances, an establishment-specific HSI must be maintained at that establishment.
- If it is determined that an office-specific HSI is needed, the **Office Manager (Operations)** shall assure that one is developed and maintained by someone appointed as the establishment's SDS Administrator.
- The content of the office-specific written inventory shall be updated as new hazardous substances are procured for, or removed from, the establishment and shall be verified by the **Region SH&E Manager** through regular inspections of the establishment.

- In order to meet the 30-years-after-employment-termination record retention requirement, the office or project specific HSIs shall be managed as a permanent record.

Prior to using any chemical, a Task Hazard Analysis (THA) shall be completed by the employees assigned to use the chemical. The analysis will identify the hazards associated with the tasks to be performed and prescribe the Personal Protective Equipment (PPE) to be used, refer to *S3NA-208-PR1 Personal Protective Equipment Program*.

4.6 Safety Data Sheets (SDS)

4.6.1 Establishment-Specific SDS Inventory

- If it is determined that an AECOM establishment is required to maintain an establishment-specific inventory SDSs for the specific hazardous substances must be maintained on file at that establishment.
- The **Region SH&E Manager** shall audit the local office or project for SDS request and maintenance and report deficiencies to the appropriate management level, as necessary, to assure compliance with this SOP.

4.6.2 Field Project Sites and Client Facilities

- The **Project Manager** and/or the **Site Safety Officer** shall access or obtain, and maintain copies of SDS from:
 - All AECOM subcontractors bringing chemicals onto the project site; and
 - The client, for all of the client's chemicals to which AECOM or AECOM subcontract employees are potentially exposed.

4.6.3 Employee Access to SDSs

SDSs should be maintained at the local establishment that uses that hazardous substance. Copies of the SDS should be made available to the employee upon request to the office's SDS Administrator.

4.6.4 Field Access to SDSs

When hazardous substances are brought into the field, the user must assure that a copy of the SDS for that substance accompanies it and is available at the field location where it is to be used.

4.6.5 SDSs for AECOM Products

It is unlikely that AECOM activities would create a chemical for which a new SDS were needed. If such a chemical were created, the **SH&E Department** shall work with the appropriate operations groups to draft, review, and publish the new SDS.

4.6.6 Content of the Safety Data Sheet:

- Safety Data Sheets, previously referred to as Material Safety Data Sheets, will now require a 16-section format that is essentially the same as the ANSI standard for *Hazardous Workplace Chemicals-Hazard Evaluation and Safety Data Sheets and Precautionary Labeling Preparation* (ANSI Z400.1 & Z129.1 – 2010).
- Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
- Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.
- Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.
- Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

- Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.
- Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.
- Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.
- Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).
- Section 9, lists the chemical's characteristics.
- Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.
- Section 11, Toxicological information includes routes of exposure; related symptoms, acute and Section 9, Physical and chemical properties chronic effects; numerical measures of toxicity.
- Section 12, Ecological information
- Section 13, Disposal considerations
- Section 14, Transport information
- Section 15, Regulatory information
- Section 16, Other information, includes the date of preparation or last revision.

SDSs that do not contain this information shall be returned to the distributor or manufacturer to be updated.

4.6.7 Trade Secrets

Some hazardous substance suppliers may claim the information requested on SDSs is proprietary and not provide the information to AECOM.

When SDSs supplied to the **Region SH&E Manager** indicate that proprietary information has been withheld, the **Region SH&E Manager** will either obtain the necessary information to make a hazard assessment or reject the material for use within AECOM.

4.6.8 For Canadian operations, all relevant SDS must be current (no more than 3 years old) and readily available (in French and English) for all hazardous materials.

4.7 Labeling

4.7.1 Containers of hazardous substances used or stored in each AECOM establishment must be labeled, tagged or marked with the following information:

- Product name or Identifier;
- Hazard Pictogram;
- Signal Word;
- Physical, Health, Environmental Statements;
- Supplemental Information;
- Precautionary Measures and Pictograms;
- First Aid Statements;
- Name and Address of Company; and
- Telephone Number.

- 4.7.2 Labels on containers shall not be removed or defaced. Labels or other forms of warning shall be legible, in English and French (Canada), and prominently displayed on the container.
- 4.7.3 Any failure to have the appropriate labeling information on a container at any time will be cause to suspend use of the product until the container is properly labeled.

4.7.4 Carcinogen Labeling

Chemicals which have been indicated as positive or suspect carcinogens by either OSHA, ACGIH, the International Agency for Research on Cancer (IARC) (World Health Organization), or the National Toxicology Program (NTP) will be considered to be carcinogenic for purpose of the HCS. The following pictogram will be used to identify carcinogens:



4.7.5 Stationary Process Containers

If there is stationary process equipment within a work area, signs, placards, process sheets, batch tickets, operating procedures, or other such written materials may be used in lieu of fixed labels on the containers, as long as the alternative method conveys the appropriate hazard information. The written materials shall be readily accessible to the employees in the work area.

4.7.6 Portable Containers

Portable containers of hazardous substances need not be labelled when the substance is transferred from labelled containers and is intended for immediate use of the employee who performs the transfer.

Containers of hazardous substances transferred from labelled containers and not intended for the immediate use of the employee performing the transfer shall be labelled with the chemical name and a hazard warning label in accordance with the National Fire Protection Association's (NFPA) 704M Hazard Identification System shall be attached.

4.8 Chemical Storage

- 4.8.1 Hazardous chemicals are to be stored in labeled containers with the lids securely closed and taped if possible.
- 4.8.2 Flammable and combustible materials must be stored in fire impervious cabinets in designated stockroom areas. Chemicals must be stored in compliance with instructions provided on their labels, SDS, or the manufacturer's specifications.
- 4.8.3 All hazardous chemicals must be stored in a manner that prevents spillage and leakage from exposing people or the environment to the chemical.
- 4.8.4 Hazardous chemicals shall not be stored with foods or beverages. Food and beverages shall not be consumed in areas where hazardous chemicals are used or stored.

4.9 Chemical Use in Offices

- 4.9.1 In general, hazardous substances should not be taken into office areas, conference rooms, or break areas, contact the **SH&E Department** for guidance. If this general requirement is infeasible.
- 4.9.2 General exceptions to this rule are the following:
- Liquid paper;
 - Toner;
 - Cleaners;
 - Isobutylene calibration gas; and
 - pH calibration solutions for instruments.
- 4.9.3 Each office or location using or storing hazardous materials will develop a written office/ location-specific Hazard Communication/WHMIS Program.

- 4.9.4 If the local office decides to implement the requirements of the standard in any way that differs from this procedure, they shall verify the changes with the **SH&E Department**, document the changes, and communicate the differences to all affected employees.
- 4.10 Canada-specific
 - 4.10.1 Consumer products are exempt from supplier labels and SDS requirements. Some cleaning solvents may be packaged as consumer products and these must be labeled in accordance with the Consumer Product Act requirements.
 - 4.10.2 In addition to the labelling of storage containers in the workplace, the contents of process piping (including valves), process vessels and reaction vessels are required to be identified through the use of colour coding, labels, placards or other modes of identifications that must be communicated to workers through training programs. It is very important for employees to be aware of and understand Client labelling requirements for these types of process systems.

5.0 Records

- 5.1 None

6.0 Attachments

- 6.1 None

Americas

Hazardous Materials Handling, Shipping, and Manifesting

S3NA-508-PR1

1.0 Purpose and Scope

- 1.1 Prescribes the minimum requirements for shipping samples, hazardous materials (HZM) and dangerous goods. It is designed to provide a framework for compliance with the requirements of the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR) published under 49 CFR or Transport Canada Transportation of Dangerous Goods Regulations (TDG Regulations) published under Amendment 6 (SOR/2008-34) for shipment of hazardous materials/dangerous goods by land, and the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR) for shipping dangerous goods by air, and other applicable regulations in other countries.
- 1.2 Applies to all AECOM Americas based staff and operations.

2.0 Terms and Definitions

A complete list of definitions can be found in their entirety in the HMR, the TDG Regulations, and the IATA DGR. The below represents those terms most likely to affect AECOM's operations.

- 2.1 **Agency Letter** – A letter approved by both AECOM's Legal Department and the client and that authorizes AECOM to act as its agent for the purpose of arranging for the transport and/or disposal of waste, and indemnifies AECOM's liability when acting "As an Agent of [client's name]".
- 2.2 **Carrier** – A person engaged in the transportation of passengers or property by land, water, or air either as a common, contract, private carrier, or civil aircraft.
- 2.3 **Dangerous goods** – Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the TDG Regulations and/or IATA regulations or which are classified according to the TDG Regulations and/or IATA regulations, generally synonymous with hazardous materials.
- 2.4 **Delegations of Authority (DOA)** – The framework of authority within which AECOM (Americas) carries out its day-to-day operations.
- 2.5 **Generator** – The party that created the hazardous waste; hazardous waste generators are divided into categories based on the amount of waste they produce each month.
- 2.6 **Hazardous materials (HzM)** – A substance or material which has been determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials.
- 2.6.1 Hazardous materials may include, but are not limited to: batteries, adhesives, paints, compressed gases, nuclear density meters, laboratory reagents, field samples, soil and sand siftings, hazardous wastes, and materials used for bench scale and pilot plant operations. While most environmental samples (both water and soil) do not meet the definition of hazardous material, extreme care must be taken to properly classify materials. HzM Classifications are as follows:
- Class 1 Explosives;
 - Class 2 Gases;
 - Class 3 Flammable Liquid;
 - Class 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet;
 - Class 5 Oxidizer, Organic Peroxide;

- Class 6 Poison (Toxic), Poison Inhalation Hazard, Infectious Substance;
- Class 7 Radioactive;
- Class 8 Corrosive; or
- Class 9 Miscellaneous Hazardous Material.

- 2.7 **Hazardous Waste (HzW)** – A “solid waste” which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (1) Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored or disposed of, or otherwise mismanaged; or (2) cause or contribute to an increase in mortality, or an increase in irreversible or incapacitating illness. Four types of hazardous waste exists:
- Listed Waste: Wastes that USEPA has determined are hazardous. The lists include the F-list (waste from common manufacturing and industrial processes), K-list (wastes from specific industries), and P- and U-lists (wastes from commercial chemical products).
 - Characterized Wastes: Wastes that do not meet any of the listings above but that exhibit ignitability, corrosivity, reactivity, or toxicity.
 - Universal Wastes: Batteries, pesticides, mercury-containing equipment and lamps.
 - Mixed Wastes: Waste that contains both radioactive and hazardous waste components.
- 2.8 **Hazardous Waste Manifest System** – A set of forms, reports, and procedures designed to seamlessly track hazardous waste from the time it leaves the generator facility where it was produced, until it reaches the off-site waste management facility that will store, treat, or dispose of the hazardous waste.
- 2.9 **HzM employee** – A person who is employed by AECOM who in the course of employment directly affects dangerous goods/hazardous materials transportation safety. This term includes employees who prepare hazardous materials for transportation, or are responsible for safety of transporting hazardous materials.
- 2.10 **HzM employer** – A person who uses one or more of its employees in connection with transporting dangerous goods/hazardous materials in commerce, causing hazardous materials to be transported or shipping in commerce.
- 2.11 **HMR** – Hazardous Material Regulation
- 2.12 **IATA** – International Air Transport Association.
- 2.13 **ICAO** – International Civil Aviation Organization
- 2.14 **Manifest** – A paper document that contains information on the type and quantity of the waste being transported, instructions for handling the waste, and signature lines for all parties involved in the disposal process, which must be signed by each party that handles the waste.
- 2.15 **Materials of Trade (MOT)** – A hazardous material, other than a hazardous waste, that is carried on a motor vehicle:
- For the purpose of protecting the health and safety of the motor vehicle operator or passengers;
 - For the purpose of supporting the operation or maintenance of a motor vehicle (including its auxiliary equipment); or
 - By a private motor carrier in direct support of a principal business that is other than transportation by motor vehicle.
- 2.16 **NAPL** – Non-aqueous phase liquid
- 2.17 **Offeror** – Any person who performs functions including selecting packaging, physical transfer of hazardous materials, classifying hazardous materials, preparing shipping papers, signing hazardous material certifications on shipping papers (as agent for), marking or placarding vehicles or packagings, or providing placards to carriers.

- 2.18 **Reportable Quantity (RQ)** – The spill- or incident-related quantity of a material listed in the applicable Federal, State, or Provincial regulations requiring a formal report.
- 2.19 **Serious Hazardous Materials Incident** – Anytime a material is found outside of its containment and has the potential to harm people or the environment.
- 2.20 **Shipper** – see Carrier
- 2.21 **Transporter** – An entity that moves hazardous waste from one site to another by highway, rail, water, or air.

3.0 References

- 3.1 S3NA-003-PR1 SH&E Training
- 3.2 S3NA-004-PR1 Incident Reporting
- 3.3 [Sub-Delegations of Authority, Americas](#)

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Manager / Office Manager (Operations)

- Verifying the potential to ship HzM via a carrier during the planned scope of services and if confirmed, identify the appropriately trained individuals are available to support the HzM shipment.
- Prior to authorizing an AECOM employee to sign a client's Hazardous Waste Manifest, the Project Manager will:
 - Verify with the Office of Risk Management that the necessary Sub-Delegations of Authority, Americas approvals are in-place;
 - Obtain an Agency Letter approved by both the client and Region Counsel.
- Prior to assignment, confirm that employees are properly trained to perform their job-specific assignments.
- Filing copies of all HzM shipping documents in the project files.
- Providing for the appropriate storage of the HzM in the office or other necessary location.
- Verifying that the HzM to-be shipped is prepared/packaged by the designated DOT Level 1 or 2 Shipper.
- Immediately reporting any incident, spill, release, mishandling, mislabelling, etc. related to a HzM shipment to AECOM's Incident Reporting Line, refer to *S3NA-004-PR Incident Reporting*.

4.1.2 Employee

- Shipping or transporting HzM as authorized.
- Signing a client's Hazardous Waste Manifest as authorized.
- Immediately reporting any incident, spill, release, mishandling, mislabelling, etc. related to a HzM shipment to the Supervisor.

4.1.3 DOT Level 1 Shipper

- Identifying, with the support of a DOT Level 2 Shipper, the appropriate HzM shipping requirements (i.e., packaging, labelling, regulated status, and shipping documents).
- Preparing the necessary HzM shipping documents.
- Contacting a DOT Level 2 Shipper if uncertain of the shipping requirements.

- Maintaining the appropriate training as required by the HMR, TDG, and IATA.

4.1.4 DOT Level 2 Shipper

- Serving as the HzM shipping Subject Matter Expert for the Geography, Region, or other business unit, as appropriate.
- Supporting information requests from DOT Level I Shippers.

4.1.5 Americas SH&E Director

- Contracting a 24-hour emergency response service with a telephone number that will be answered by a person either with information on the hazards of the shipment or with immediate access to such a person.
- Maintaining the annual renewal of AECOM's U.S. DOT Hazardous Materials Registration.
- Posting AECOM's Hazardous Materials Registration on myAECOM.
- Defining the training to be required of employees involved in HZM shipping and facilitate the delivery of that training.

4.1.6 Region SH&E Manager

- Provide resources to employees involved in shipping hazardous materials.
- Approving the designation of a DOT Level 2 Shipper.
- Supporting the delivery of HzM shipping and Hazardous Waste Manifest training.

4.1.7 Region Counsel

- Reviewing and approving the Agency Letter authorizing AECOM to sign a client's Hazardous Waste Manifest "As an Agent of [client's name]".
- Updating the template Agency Letter to address additional liabilities, as necessary.
- Providing the template Agency Letter to Project Managers, as requested.

4.1.8 Office of Risk Management

- Supporting Project Managers in understanding the applicable *Sub-Delegations of Authority, Americas* requirements as it pertains to signing a client's Hazardous Waste Manifest "As an Agent of [client's name]".

4.2 General Requirements

- 4.2.1 **Employees** designated as HzM **DOT Level 1 or 2 Shippers** are the only individuals authorized to physically transport or prepare documents to ship HzM via a carrier.
- 4.2.2 Specific technical names must be used on shipping documents (i.e., Shipper's Declaration for Dangerous Goods); never use an acronym (i.e., LNAPL) as the technical name.
- 4.2.3 Shipments of HzM must be placed in appropriate containers to prevent any leaks or releases of the HzM.
- 4.2.4 All HzM shipments via a carrier must be reported to INFOTRAC (for U.S.) and CANUTEL (for Canada) prior to shipment.
- 4.2.5 **Employees** are not authorized to physically transport HzM quantities, in a motor vehicle, in excess of the MOT limits.
- 4.2.6 **Employees** are only authorized to sign a client's Hazardous Waste Manifest if:
- The necessary approvals have been obtained per the *Sub-Delegations of Authority, Americas*;
 - The client could not logistically sign the manifest given they were not on the site;
 - An Agency Letter was signed by the client and approved by **Region Counsel**; and

- **Employees** completed the required training.

4.2.7 AECOM will never be identified as the GENERATOR on a client's Hazardous Waste Manifest.

4.2.8 Never sign a client's Hazardous Waste Manifest as AECOM, sign "As an Agent of [client name]".

4.3 Training

4.3.1 **Employees** involved in shipping hazardous materials/dangerous goods (e.g., packaging, preparing paperwork, loading and/or unloading, and transporting hazardous materials) are required to have documented training prior to shipping activities, refer to *S3NA-003-PR SH&E Training*. Training requirements are based on the type of materials shipped (e.g., calibration/compressed gases, laboratory reagents, field samples, hazardous wastes, etc.) and employee responsibility.

- **DOT Level 1 Shipper** Performance Training: The specific content of this 4-hour training will vary depending on the country in which you are performing work (Canada vs. US) and is focused on proper procedures for packaging, labeling and shipping HzM/HzW over land and sea. This training has a three year renewal requirement.
- **DOT Level 2 Shipper** Performance Training: A comprehensive 2-day HzM shipping training course typically completed in an in-person seminar.
- **IATA** Performance Training: This training supplements Level 1 training and provides additional information for the proper shipment of HzM/HzW via air transportation. This training has a two year renewal requirement.
- **Resource Conservation and Recovery Act (RCRA) Part B Awareness Training (US Project Sites)**: Applicable to employees shipping HzW, including listed wastes, from US project sites. General RCRA Awareness training can be completed through online vendors. Additional project-specific training regarding HzW generation, project site roles and responsibilities, HzW management and shipment will need to be coordinated between the **Project Manager** and Client. Training may also include procedures for signing waste documents, i.e. profiles and characterization forms, where permitted by client contracts. Training will be provided in accordance with Permits, Consent Orders or other Regulatory Agency-issued agreements regarding project site HzW generation. This training has an annual renewal requirement.

5.0 Records

5.1 Bill of Lading, Shipper's Declaration for Dangerous Goods, Agency Letter and Hazardous Waste Manifest will be retained in the project files.

6.0 Attachments

6.1 S3NA-508-WI1 Hazardous Materials Shipping Guidelines

Hazardous Materials Shipping Guidelines

1.0 Purpose and Scope

- 1.1 The following information outlines the generally accepted guidelines for preparing a HzM or Dangerous Goods package for shipment in compliance with the requirements of the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR) published under 49 CFR or Transport Canada Transportation of Dangerous Goods Regulations (TDG Regulations) published under Amendment 6 (SOR/2008-34) for shipment of hazardous materials/dangerous goods by land, and the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR) for shipping dangerous goods by air. However, this information is not implied or to be construed as a replacement for the regulatory requirements, rather this information is intended to help an individual better understand the necessary steps and formulate questions surrounding the shipment of HzM and/or Dangerous Goods.

2.0 Shipping

- 2.1 Select the best way to ship the hazardous material based on the quantity, hazard(s), and mode of transportation (e.g., air, land, water). Since more restrictive requirements apply to air shipments, ground shipment (e.g., use of a lab courier service) is encouraged for shipping HzM.
- 2.2 Most (if not all) package shipments (Common Carriers such as Federal Express, UPS, etc.) are transported by air. Air transportation of hazardous materials is regulated by IATA. AECOM will occasionally ship HzM internationally (e.g., Puerto Rico is considered an international destination by Federal Express). AECOM employees must follow the IATA DGR for any air transportation of hazardous materials.

3.0 Ground transportation of HzM may use either HMR or TDG Regulations protocols

- 3.1 Specific packaging and shipping instructions apply to all dangerous goods shipments. These instructions vary by chemical/product and are different for passenger aircraft and cargo aircraft.
- 3.2 Carrier-specific requirements can be obtained from the Internet or by calling the carrier's customer service line.
- 3.3 The process for offering HzM for shipment includes:
- Determine the proper shipping name, hazard class, labeling requirements, and packing group.
 - Determine and comply with the proper packaging instructions.
 - Choose the proper package based on the packaging instruction and the type and quantity of material being shipped.
 - Ensure package contents are compatible.
 - Package, mark and label according to applicable regulations and instructions.
 - Prepare shipping papers and complete the bill of lading or shipper's declaration for dangerous goods, according to applicable regulations and according to the carrier's specific requirements.
 - Include on the shipping documents the shipper's certification, emergency response information and telephone number.
 - Include with the shipment a copy of the applicable emergency response information with shipping papers for responders to use in emergency situations. This information includes, but is not limited to, appropriate pages from the DOT Emergency Response Guidebook (ERG) and/or Material Safety Data Sheets (MSDS).

- 3.4 AECOM employees participating in shipping HzM are required to provide a 24-hour emergency response telephone number that must be answered by a person either with information on the hazards of the shipment or with immediate access to such a person. AECOM has selected INFOTRAC® (<http://www.infotrac.net/>) to provide 24-hour emergency response support service. All HzM shipping papers which list INFOTRAC® for 24-hour emergency response must list AECOM's account number 74984.
- 3.5 Determine the placard or placards required for the materials being offered for transportation, provide placards and affix as required.
- 3.6 Notify the carrier of the proper shipping name, hazard class and total quantity of each hazardous material being offered for transportation, and make a final check for compliance with regulations and instructions before tendering the shipment to the carrier. All HzM shipping papers and dangerous goods airbills must be typed.

Americas

Hazardous Waste Operations and Emergency Response Activities

S3NA-509-PR1

1.0 Purpose and Scope

- 1.1 Provides requirements for AECOM operations pertaining to hazardous waste and emergency response (HAZWOPER) services.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.
- 1.3 In Canada there is no direct federal or provincial counterpart to HAZWOPER; however, as due diligence and in compliance with applicable provincial duty of care/general duty clauses, staff working in Canada will comply with this procedure.

2.0 Terms and Definitions

- 2.1 **Emergency Response** – A response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence that results, or is likely to result, in an uncontrollable release of a hazardous substance. Responses to incidental release of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area or by maintenance personnel are not considered to be emergency responses within the scope of the HAZWOPER standard. Responses to releases of hazardous substances where there is no potential safety or health hazard are not considered to be emergency responses.
- 2.2 **Health and Safety Plan (HASP)** – A document prepared for each project that contains site-specific information including the Emergency Response Plan for the project.
- 2.3 **Incident Command System (ICS)** – ICS is a standardized on-scene incident management concept designed specifically to allow responders to adopt an integrated organizational structure equal to the complexity and demands of any single incident or multiple incidents without being hindered by jurisdictional boundaries. In the ICS the first person responding to an incident becomes the Incident Commander and turns that title and duties over to more qualified responders as they arrive on scene.
- 2.4 **First Responder** – First responders are individuals who are likely to witness or discover a hazardous substance release, injury, fire, or other incident and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond first aid, initial control of the incident, and notifying the authorities and others of the incident.
- 2.5 **Hazardous Materials Specialist** – Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with federal, state, local, and other government authorities in regards to site activities.
- 2.6 **Hazardous Materials Technician** – Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.
- 2.7 **Incident Commander** – The Incident Commander (IC) is responsible for all aspects of the response, including developing incident objectives and managing all incident operations. The title and responsibilities are typically assumed by a qualified IC from the client or public sector.
- 2.8 **Hazardous Waste** – Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded

commercial products, like cleaning fluids or pesticides, or the byproducts of manufacturing processes. Hazardous waste are divided into

- Listed wastes (<http://www.epa.gov/osw/hazard/wastetypes/listed.htm>),
- Characteristic wastes (<http://www.epa.gov/osw/hazard/wastetypes/characteristic.htm>),
- Universal wastes (<http://www.epa.gov/osw/hazard/wastetypes/universal/index.htm#wastes>), and
- Mixed wastes
- Specific procedures determine how waste is identified (<http://www.epa.gov/osw/hazard/wastetypes/wasteid/index.htm>), classified, listed, and delisted.

2.9 **Hazardous Materials** – A hazardous material is any item or agent (biological, chemical, physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Additionally a hazardous material may be defined as any substance or chemical which is a "health hazard" or "physical hazard," including chemicals that are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents that act on the hematopoietic system; agents that damage the lungs, skin, eyes, or mucous membranes; chemicals that are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive, or water-reactive; and chemicals that in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists, or smoke that may have any of the previously mentioned characteristics. This may be caused when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, disposing into the environment, by being transported or moved, and items or chemicals that are "special nuclear source" or byproduct materials or radioactive substances.

3.0 References

- 3.1 Federal Emergency Management Agency—FEMA: Incident Command System www.fema.gov
- 3.2 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
- 3.3 29 CFR 1910.38, Emergency Action Plans
- 3.4 I2-141-PR1 Subs Management Procedure
- 3.5 I2-221-PR1 Project Plan Procedure
- 3.6 Q3NA-141-PR1 Subs Management – Procurement, Oversight and Ratings
- 3.7 S3NA-003-PR1 SH&E Training
- 3.8 S3NA-004-PR1 Incident Reporting
- 3.9 S3NA-203-PR1 Emergency Response Planning, Field
- 3.10 S3NA-208-PR1 Personal Protective Equipment Program
- 3.11 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.12 S3NA-520-PR1 Spill Response, Incidental
- 3.13 S3NA-602-PR1 Exposure Monitoring
- 3.14 S3NA-604-PR1 Medical Records
- 3.15 S3NA-605-PR1 Medical Surveillance Program

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Office Manager (Operations)

- Provide support to the implementation of Health and Safety Plans and Emergency Action Plans.

4.1.2 Project Manager

- Prepare or request a HASP for every AECOM project with Hazardous Waste Operations and Emergency Response Activities, refer to *S3NA-209-PR1 Project Hazard Assessment and Planning*.
- Verify that all personnel working on the project are qualified.
- Request client's emergency response procedures.
- Appoint a Site Safety Officer (SSO) for each project.
- Communicate the site-specific emergency response details to all employees assigned to a field project.
- Confirm that the necessary communications equipment for the project is available.
- Confirm that an accident/incident investigation is performed and a report is filed; refer to *S3NA-004-PR1 Incident Reporting*.

4.1.3 Region SH&E Manager / SH&E Department

- Provide technical guidance for the development and implementation of Health and Safety Plans and Emergency Action Plans.
- Prepare emergency action plans as part of project HASPs and emergency reference sheets.
- Interface with the local emergency responders when necessary.
- Interface with clients regarding facility emergency response procedures.

4.1.4 Site Safety Officer (SSO)

- Verify that a HASP is available for the project.
- Communicate the site-specific emergency response details to all employees assigned to a field project.
- Stop work and initiate emergency response procedures as required.
- Account for all AECOM and subcontractor employees after site evacuation.
- Conduct pre-entry briefing and daily tailgate meetings and review facility and site-specific emergency procedures.
- Brief on-site and off-site responders in the event of an emergency.

4.1.5 Employees

- Maintain HAZWOPER training.
- Follow the HASP and emergency procedures prepared for the project.
- Initiate emergency response via verbal communications or the alarm system if first to encounter the emergency.

- 4.1.6 All personnel (e.g., AECOM **employees**, general laborers, equipment operators, chemists, supervisors, etc.) performing activities at hazardous waste sites that expose or potentially expose them to hazardous wastes and health hazards are considered HAZWOPER site workers and must meet the training and medical surveillance requirements specified in 29 CFR 1910.120(e) and (f),

respectively. Additional training may be required based on site activities including related exposures and risks (e.g., confined space entry, excavations, fall protection, other materials [lead], etc.). These additional training requirements are to be outlined in the project- or site-specific health and safety plan (HASP).

4.2 Personnel Qualifications—Medical Surveillance and Training

4.2.1 HAZWOPER-qualified employees will participate in the following medical surveillance and training requirements. Medical surveillance and SH&E training requirements are further described in *S3NA-605-PR1 Medical Surveillance* and *S3NA-003-PR1 SH&E Training* respectively.

4.2.2 Medical Surveillance

Specific HAZWOPER medical examination protocols have been developed by **AECOM's Corporate Medical Provider (CMP)** to meet the requirements of 29 CFR 1910.120(f). To be medically qualified to perform HAZWOPER work, **employees** receive the following medical examinations:

- Initial (Baseline) Examination—The initial examination is part of pre-employment requirements and must be completed (with results received) prior to the employee's start of work date.
- Annual Examination—HAZWOPER-qualified employees will complete a medical examination once each year. Medical qualification expires on the anniversary date of the last examination completed. There will be no "grace period" exemptions beyond this date without the express approval of the **Region SH&E Manager**. At the recommendation of the **SH&E Department**, the CMP may approve an alternate examination frequency at periods of up to two years (biennial) in cases in which the worker's exposures to environmental contaminants are infrequent and typically well below any occupational exposure limits (e.g., senior management personnel).
- Termination Examination—When reassigned to non-HAZWOPER duties, or at the conclusion of employment at AECOM, HAZWOPER-qualified personnel will be provided with the opportunity to receive a termination medical examination.
- Special Examinations—The **SH&E Department** and the CMP will jointly determine the need for special examinations because of:
 - Unusual exposure conditions; and
 - In response to possible overexposures.

The **CMP** will determine the medical protocol elements for each of these examinations based on exposure information provided by the **SH&E Department**. The **CMP** will evaluate the results of each employee's examination and will provide a written statement of medical clearance clearly stating medical compliance with the HAZWOPER regulatory standard (29 CFR 1910.120(f)) and approval of the employee to perform unrestricted HAZWOPER activities. For initial and annual examinations, the **CMP** will also evaluate the **employee** for the use of air purifying and supplied air respiratory protection. The written evaluation from these examinations will indicate the **CMP's** approval/limitations on the employee's use of respiratory protection.

4.2.3 Training

All personnel assigned to work at a hazardous waste site must participate in training meeting the requirements of 29 CFR 1910.120(e).

Initial 40-Hour Training—Before being assigned to a HAZWOPER site, AECOM employees must complete 40 hours of off-site training meeting the requirements of 29 CFR 1910.120(e)(3)(i). At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (40-hour HAZWOPER) and training dates. A copy of this certification must be provided to the employee's **Region SH&E Manager**. **Employees**

are responsible for maintaining their own copy of this certificate and for presenting it to the **site safety officer** when working on any HAZWOPER site.

In addition to the initial 40-hour training, the **employee** must receive three days of actual supervision by a trained experienced supervisor.

Available Training Sources:

- On-site training provided by the **SH&E Department**.
- Outsourced training providers approved by the **SH&E Department**.

Refresher 8-Hour Training—To remain qualified to perform on-site HAZWOPER work activities, each AECOM **employee** will complete 8 hours of HAZWOPER refresher training meeting the requirements of 29 CFR 1910.120(e)(8) at yearly intervals following completion of Initial 40-hour training. At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (8-hour HAZWOPER Refresher) and the training date. A copy of this certification must be provided to the employee's SH&E Coordinator. **Employees** are responsible for maintaining their own copy of this certificate and for presenting it to the site supervisor when working on any HAZWOPER site.

Available Training Sources:

- Internet-based training approved by **SH&E Department**;
- On-site training provided by the **SH&E Department**; and
- Outsourced training providers approved by the **SH&E Department**.

Supervisor 8-Hour Training—Any AECOM employee acting in a management capacity for HAZWOPER activities (e.g., **project manager, site safety officers**, etc.) must complete an additional 8 hours of HAZWOPER Supervisor training meeting the requirements of 29 CFR 1910.120(e)(4). Although this training is required only once, supervisors must maintain their overall HAZWOPER qualification through annual completion of refresher training. At the conclusion of Supervisor 8-Hour Training personnel will receive a written certification of course completion, signed by the instructor that indicates the course of instruction and the training date. A copy of this certification must be provided to the **Region SH&E Manager**. **Employees** are responsible for maintaining their own copy of this certificate and for presenting it to the senior site supervisor when working on any HAZWOPER site.

Available Training Sources:

- On-site training provided by the **SH&E Department**, and
- Outsourced training providers approved by the **SH&E Department**.

24-Hour HAZWOPER Training—Site support contractors and site visitors may qualify to substitute 24-hour HAZWOPER training in place of 40-hour training, as specified in 29 CFR 1910.120(e)(3)(ii). Personnel potentially qualifying for this alternative training include:

- Site support personnel who will not work in any Exclusion Zone areas.

Subcontractors and site visitors whose duties will not entail significant exposure to site contaminants defined as not working in any areas where airborne contaminant concentrations exceed one-half of any applicable occupational exposure limit, and no contact or exposure to materials with site contaminant concentrations exceeding natural background levels. The **Region SH&E Manager** or **SH&E department** designee must approve the substitution of 24-hour training for initial 40-hour training. Persons qualifying for 24-hour training must provide written certification of course completion prior to beginning work on site. Persons completing 24-hour training must complete 8 hours of annual refresher training at the required interval to maintain eligibility for on-site work and must provide proof of this training (as necessary to demonstrate retraining) prior to beginning work on site.

4.2.4 Subcontractor Personnel

Any subcontractor organization whose employees will support AECOM operations at a HAZWOPER site will:

- Provide the **Project Manager** with a copy of their written HAZWOPER medical surveillance and training program requirements. The elements of the program(s) must be similar to those for AECOM's own program, as detailed above, refer to *I2-141-PR1 Subs Management Procedure* and *Q3NA-141-PR1 Subs Management – Procurement, Oversight and Ratings*.
- Provide the **Project Manager** with written certification of a physician's approved medical clearance for each employee who will work on the site. Certification can be demonstrated by:
 - A copy of the physician's signed medical clearance for each **employee** (preferred), or
 - A letter identifying the medical status and clearance expiration date of every **employee**, signed by the company's safety director or an officer of the company.
 - A copy of the each employee's training certifications, which will include:
 - The initial 40-hour training certificate (24-hour training may be substituted with **Region SH&E Manager** approval).
 - The most current Refresher training certificate (must be current within the previous one-year period).
 - A copy of the Supervisor training certificate for each person serving in a site supervisory capacity (e.g., **project manager, site safety officers**, etc.).

4.3 Project SH&E Documentation—Health and Safety Plans (HASP)

4.3.1 The project SH&E documentation prepared for HAZWOPER activities is referred to as a site-specific Health and Safety Plan (HASP), and must meet the requirements presented in 29 CFR 1910.120(b)(4).

4.3.2 A safety and health risk or hazard analysis for each on-site task that will be performed.

4.3.3 The required HASP plan elements include:

- A description of the work location, the site history, and a summary of any information available concerning site hazards (including both physical hazards and contamination conditions);
- A summary of the work activities to be performed under AECOM's scope of activities;
- Identified risks must include both chemical and physical hazards to which personnel may be exposed during the conduct of the work task;
- Protective measures for each work task to prevent or mitigate the potential hazards identified in the hazard analyses;
- Personal protective equipment (PPE) requirements for each work task, refer to *S3NA-208-PR1 Personal Protective Equipment Program*;
- Frequency and types of air monitoring, personal monitoring, and environmental sampling techniques and instrumentation to be used;
- Site control measures;
- Decontamination procedures; and
- An emergency response plan, *S3NA-509-FM4 Emergency Information and Hazard Assessment*, addressing actions to be taken in the event of each type of credible incident that might result during the performance of planned work activities, including minor and major injuries, and chemical release and fire. Response plans must address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.

4.3.4 Responsibility for development of each AECOM HASP will be coordinated between the **Project Manager** and the **Region SH&E Manager** or **SH&E Department** designee as part of project initiation. Regardless of where the HASP is developed, it will be reviewed and approved by the **SH&E Department** prior to submission to any agency outside of AECOM.

4.3.5 Contractors and Subcontractors

4.3.5.1 The health and safety of any contractor's or subcontractor's employees is solely the responsibility of that contractor or subcontractor, who shall evaluate the hazards and potential hazards to their own employees and shall adhere to their own Health and Safety Plan.

4.3.5.2 In addition, all AECOM subcontractors' Health and Safety Plans will, at a minimum conform to the requirements of the AECOM Health and Safety Plan. The AECOM Health and Safety Plan does not, nor is it intended to, address procedures of contractors or subcontractors during their site activities.

4.4 Personal Protective Equipment (PPE) Ensembles

4.4.1 Defined HAZWOPER PPE ensembles are specified for general use on all AECOM HAZWOPER operations. The project HASP may specify modifications to these requirements to meet site-specific conditions.

4.4.2 Level D Ensemble

The Level D ensemble provides a minimal level of skin protection (primarily against physical rather than chemical hazards) and no respiratory protection. Level D PPE is the minimum work uniform which will be used on HAZWOPER sites. Its use is appropriate when there is no significant potential for encountering hazardous substances or health hazards while working in controlled work areas.

Level D Equipment List:

- Hard hat,
- Eye protection,
- Safety-toe work boots,
- Shirts with sleeves and long pants (shorts are unacceptable for use), and
- Hearing protection (as required).

4.4.3 Modified Level D Ensemble

The Modified Level D ensemble provides moderate skin protection against contact with hazardous substances, but no respiratory protection. Its use is appropriate where there is a moderate-to-low potential for skin contact with known hazardous substances and health hazards, but no significant inhalation hazard is anticipated. The Modified Level D ensemble will consist of the Level D ensemble, supplemented by the addition of one or more of the following items:

Modified Level D Equipment List:

- Chemical-resistant disposable outer coveralls,
- Chemical-resistant outer gloves taped to outer coveralls,¹
- Chemical-resistant inner gloves, and¹
- Chemical-resistant safety-toe boots (taped to outer coveralls).

¹ Selection of specific glove types/materials will be provided in the project HASP based on consideration of the contaminants and the physical conditions of the work.

4.4.4 Level C Ensemble

The Level C ensemble provides moderate skin protection against contact with hazardous substances and moderate respiratory protection. Its use is appropriate where there is the potential for skin contact with known hazardous substances and health hazards, together with a limited and well-defined potential for exposure via inhalation.

Level C Equipment List:

- Full-face air-purifying respirator (APR) equipped with cartridge types as designated in the project HASP,²
- Chemical-resistant disposable outer coveralls,
- Chemical-resistant outer gloves taped to outer coveralls,³
- Chemical-resistant inner gloves,³
- Hard hat,
- Safety-toe boots taped to coveralls; the use of boot covers (e.g., booties) or chemical-resistant boots may be specified, and
- Hearing protection (as required).

4.4.5 Level B Ensemble

The Level B ensemble provides both the highest level of inhalation exposure protection and considerable skin contact protection. Its use is appropriate where there are significant known or suspected hazardous substances and health hazards, involving both skin and inhalation exposure (up to and including Immediately Dangerous to Life or Health [IDLH] conditions) or where adverse atmospheric conditions cannot be mitigated by use of air purifying respirators (e.g., oxygen deficient atmospheres or chemicals with poor warning properties). The use of Level B PPE requires prior approval by the **Region SH&E Manager**.

Level B Equipment List:

- Supplied air respirator (SCBA or air line system with Grade D or better breathing air),
- Chemical-resistant disposable outer coveralls,
- Chemical-resistant outer glove taped to outer coveralls,³
- Chemical-resistant inner gloves,³
- Hard hat,
- Chemical resistant safety-toe boots taped to coveralls, and
- Hearing protection (as required).

4.4.6 Level A Ensemble

The Level A ensemble provides the highest level of both respiratory and skin protection, up to and including protection against skin contact with vapor-phase contaminants. The use of Level A PPE requires prior approval by the Americas SH&E Director.

Specific Level A ensemble components will be determined on a case-by-case basis by the **SH&E Department**.

² Selection of specific cartridges will be made by the SH&E Department (or Competent Person – Respiratory Protection as designated by the DSM) based on contaminants present. A cartridge change-out frequency will also be specified in the HASP based on the manufacturer's cartridge performance data.

³ Selection of specific glove types/materials will be provided in the project HASP based on consideration of the contaminants and the physical conditions of the work.

4.5 Field Emergency Response Plans

- 4.5.1 AECOM employees are not expected to take action or to participate in rescues or responses to chemical releases 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.) If AECOM employees are to participate in the response to a chemical release beyond the initial reaction, there must be a contractual provision for this response and the employees must be specifically trained for this response. This document is designed to provide guidelines on how to prepare a written plan that will ensure prompt and proper response to an emergency situation that arises during field investigations and to outline the duties of AECOM employees during a field emergency and the associated training requirements.
- 4.5.2 Site specific health and safety plans that are prepared to comply with the HAZWOPER standard (29 CFR 1910.120) must address emergency response. This standard specifically outlines the elements that must be contained in an emergency response plan. However, the definition of emergency response, as written in 29 CFR 1910.120, focuses on emergencies involving the uncontrolled release of hazardous substances. Under 29 CFR 1910.120, an employer can opt to evacuate employees from the danger area when such an emergency occurs. AECOM does not expect its employees to actively assist in the handling of uncontrollable chemical releases that may occur during the implementation of field programs. As such, and as provided by the HAZWOPER standard, AECOM is exempt from the emergency response plan requirements of the standard as long as it provides an emergency action plan within the HASP that complies with 29 CFR 1910.38 (a). Therefore, all emergency response plans required under 29 CFR 1910.120 will be written to comply with 29 CFR 1910.38 (a).
- 4.5.3 The HAZWOPER standard does not prohibit AECOM employees from performing limited response activities. AECOM employees can provide response assistance by placing absorbent pillows or vermiculite around a small, contained spill that occurs during sampling efforts. Refer to the *S3NA-520-PR1 Spill Response, Incidental* procedure which describes the specific procedures that AECOM will follow when responding to an incidental chemical spill.

4.5.4 Field Project Preparation

Every HASP that is prepared by AECOM will contain an emergency response section in which the required elements of an emergency action plan will be contained, refer to *S3NA-203-PR1 Emergency Response Planning, Field* for more specifics. For all projects that do not require a HASP, an emergency reference sheet will be prepared; minimally, the sheet will list the telephone numbers of the local emergency responders and the local hospital and provides directions to the local hospital. When AECOM is working at an operating facility, the emergency response procedures of the facility will be appended to the HASP or the emergency reference sheet.

There are two types of emergency situations that AECOM personnel must be prepared for and that must be addressed in the emergency action plan. These include:

- Emergencies related to the operations of our clients at the facility where AECOM is working.
- Emergencies related to our own on-site activities/investigations.

AECOM employees are typically not expected to take action or participate in responses to chemical releases 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.)

Employees are not to accept the role of Incident Commander without specific authority from the **Region SH&E Manager** and the **Office Manager (Operations)** responsible for the project. Assuming the role of the Incident Commander requires training beyond the scope of this Procedure.

4.5.5 Client Facility Emergency Response Procedures

AECOM implements field programs on active properties, including manufacturing facilities. These facilities have typically developed an emergency response plan that is specific to facility-related

emergencies. If AECOM is working at an operating facility, emergency procedures established by the facility must be followed in the event of a facility catastrophe. AECOM personnel must be aware of and familiar with the alarm signals used at the facility to alert personnel to an emergency. AECOM personnel must also know where to assemble in the event of a facility evacuation as the facility must be able to account for all personnel, including subcontractors such as AECOM in the event of an evacuation.

The first priority in AECOM's preparation of a project emergency action plan is to ensure that the responsibilities under the client's emergency response plan are fully understood. Because of the nature of their business, many of our clients have in-house fire brigades, medical staff, and hazardous materials teams that can assist AECOM in the event of an emergency related to our field activities. In many instances, our clients prefer or require that subcontractors seek emergency assistance through their facility first before calling outside responders to the site.

A copy of the facility's procedures must be made available to AECOM so that the information can be incorporated into the HASP or attached to the emergency reference sheet. If this information is not available to AECOM prior to arriving on site, the **SSO** must meet with client representatives upon arrival to the facility to review procedures in the event of an emergency related to plant operations.

4.5.6 Emergency Action Plan

As a minimum, each emergency action plan must contain the following topics as required by 29 CFR 1910.38 (a):

- Procedures and contact information for reporting emergencies to public service responders and on-site (client or host employer) emergency control centers.
- Emergency escape procedures and emergency escape route assignments.
- Procedures to be followed by employees who remain to operate critical site operations before they evacuate.
- Procedures to account for all employees after emergency evacuation is complete.
- Rescue and medical duties for those employees who are to perform them.
- Preferred means of reporting fires and other emergencies.
- PPE to protect employees from expected exposures and potential exposures during an emergency.
- Names of persons or departments who can be contacted for further information (i.e. emergency reference sheet).
- Availability of medical surveillance for workers who might have been exposed to chemicals, bloodborne pathogens, or other biological agents as a result of project work or emergency response.

In addition, each plan must establish the specific alarm system that will be used on site to warn employees of an AECOM emergency. The chosen alarm signals should not conflict with alarm signals already in place at the facility.

4.5.7 Escape Routes and Procedures

Prior to the commencement of on-site activities, the **SSO** must determine how AECOM employees will evacuate each AECOM work area of the site. Two or more routes that are separate or remote from each other for each work area must be identified. Multiple routes are necessary in case one is blocked by fire or chemical spill. These routes must not overlap because, if a common point were obstructed, all intersecting routes would be blocked.

Prominent wind direction should also be considered when designating escape routes and assembly areas. Escape routes and assembly areas should be upwind of the site whenever possible.

Upon arrival to the site, the **SSO** must verify that the selected routes are appropriate for evacuation. During an emergency, the quickest and most direct route should be selected. However, when working at an operating facility, the established escape routes of the facility should be used whenever possible. In the event of a facility-related emergency, all AECOM employees must meet at the facility's assembly area so that the client can verify that AECOM has evacuated the property.

4.5.8 Accounting Method for All Employees after Evacuation

The **SSO** is responsible for determining that all AECOM employees have been successfully evacuated from the work area(s). It is the responsibility of each AECOM subcontractor to verify that all of its employees evacuated the site and to report this information to the **SSO**. All employees must meet at the designated assembly area. A headcount is an acceptable way to determine complete evacuation when the field team is of a small size. The site log-in book should be referenced when attempting to account for more than 10 people. In the event of a facility-related emergency, the **SSO** must notify facility representatives that all AECOM employees and AECOM subcontract employees have successfully evacuated the work area(s). The **SSO** must notify emergency responders if any employee is unaccounted for and where on the site they were last seen.

In the event of a project-related emergency, the **SSO** will provide off-site emergency responders or on-site HAZMAT teams or fire brigades (Incident Commander) with all available knowledge about the emergency situation upon their arrival to the scene.

4.5.9 Employees Who Remain to Operate Critical Site Operations Before They Evacuate

All equipment and operations are required to cease in accordance with the established alarm signal procedures. The only exception will be related to health and safety. The **SSO** must determine at the time of the emergency if health and safety will be jeopardized by immediate stoppage of any particular piece of equipment. If such a determination is made, personnel involved in critical operations must be minimized. Once it is determined that the operation is no longer needed or the threat to the operators is imminent, operations will cease and the operators will immediately evacuate.

4.5.10 Rescue and Medical Duties

Only currently trained individuals will administer first aid or CPR. If the injury is life threatening, the Emergency Medical System (EMS) should be called (911). Depending on the procedures established for the project, the **SSO** would contact an emergency responder directly or notify the facility representatives for medical assistance. If the employee needs medical attention that cannot be provided on-site, the **SSO** shall escort the individual to the local hospital identified on the emergency reference sheet and shall remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the Project Manager and **Region SH&E Manager**.

4.5.11 Preferred Means of Reporting

Unless facility representatives specifically indicate that they prefer AECOM personnel to notify them first of an emergency, the **SSO** will directly contact the appropriate emergency responders listed on the emergency reference sheet.

4.5.12 Alarm Signals

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. However, verbal communications must be supplemented any time voices cannot be clearly perceived above ambient noise levels and any time a clear line of sight can not be easily maintained among all AECOM personnel because of distance, terrain, or other obstructions.

Portable two-way radio communications may be used when employees must work out of the line of sight of other workers.

When verbal communications must be supplemented, the following emergency signals shall be implemented using handheld portable air horns, whistles, or similar devices. Signals must be capable of being perceived above ambient noise by all employees in the affected portions of the workplace.

- One Blast: General Warning—A relatively minor and localized, yet important, on-site event. An example of this type of an event would be a minor chemical spill where there is no immediate danger to life or health yet personnel working on the site should be aware of the situation so that unnecessary problems can be avoided. If one horn blast is sounded, personnel must stop all activity and equipment on-site and await further instructions from the **SSO**.
- Three Blasts: Medical Emergency—A medical emergency for which immediate first aid or emergency medical care is required. If three horn blasts are sounded, all first aid and/or CPR trained personnel should respond as appropriate. All other activity and equipment should stop and personnel should await further instructions from the **SSO**.
- Three Blasts Followed by One Continuous Blast: Immediate Threat to Life and Health—A situation that could present an immediate danger to life and health of personnel onsite. Examples include fires, explosions, large hazardous chemical release, severe weather-related emergencies, or security threats. If three horn blasts followed by a continuous blast are sounded, all activity and equipment must stop. All personnel must evacuate the site and meet in the designated assembly area where the **SSO** will account for all employees. The **SSO** will arrange for other emergency response actions if necessary. Information concerning the need to follow decontamination procedures during an emergency evacuation will be addressed in the emergency action plan.
- The **SSO** or his designate will acknowledge the distress signal with two short blasts on the air-horn or whistle.
- One Continuous Blast Following Any of the Above: All Clear/Return to Work—Personnel who sound the initial alarm are required to send an all clear signal when the emergency is over.

4.5.13 Emergency Reference Sheet

An emergency reference sheet (see *S3NA-509-FM4 Emergency Information and Hazard Assessment*) must be prepared for projects not requiring a HASP. Each emergency reference sheet must list the following:

- Emergency phone numbers for local police, fire, and ambulance service.
- In-house facility extensions for reporting an emergency (applies to operating facilities only).
- Phone number and address of closest hospital with an emergency room to the site.
- Directions to the hospital from the site.
- Map highlighting the site-to-hospital route.
- Phone number for the Poison Control Center.
- Names and phone numbers of AECOM representatives and facility representatives.

4.5.14 On-site and Off-site Communications

Regardless of the size or location of AECOM's field projects, it is extremely important that both on-site and off-site communications be maintained so that in the event of an emergency employees can contact each other or place a phone call immediately with the appropriate responder(s).

Walkie-talkies are required when members of the field team are working in separate areas of the site and verbal communications are no longer effective because of distance. A walkie-talkie must be available for each team that is working in a separate area of the site.

When AECOM is working at an occupied facility, access to a telephone may not be a problem. When AECOM is working on abandoned properties or when there is no access to a phone, a cellular telephone must be brought to the work location.

4.5.15 Evacuation

Although emergency evacuation procedures are included in AECOM's initial 40-hour HAZWOPER training, emergency procedures at each site will be different. Therefore, employees must be instructed about the specifics of the emergency procedures developed for the site during the site-specific pre-entry briefing that must be held daily prior to the commencement of field activities. Update training is required anytime escape routes or procedures change. An evacuation drill will be conducted for projects that are scheduled for one month or longer. Visitors and untrained employees shall not be allowed into the project area until they receive a safety briefing including evacuation alarms and procedures.

4.5.16 First Responder

First responders shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

- An understanding of what hazardous substances are, and the risks associated with them in an incident.
- An understanding of the potential outcomes associated with an emergency.
- The ability to recognize the presence of hazardous substances and physical hazards in an emergency.
- An understanding of the role of the first responder.
- The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

4.5.17 First Responder HAZWOPER Operations Level

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper personal protective equipment provided to the first responder operational level.
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.

4.5.18 Hazardous Materials Technician

Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the employer's emergency response plan.

- Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System, refer to *Federal Emergency Management Agency—FEMA: Incident Command System*.
- Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.
- Understand and implement decontamination procedures.
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.

4.5.19 Hazardous Materials Specialist

Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the local emergency response plan.
- Understand classification, identification, and verification of known and unknown materials by using advanced survey instruments and equipment.
- Know the state emergency response plan.
- Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist.
- Understand in-depth hazard and risk techniques.
- Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.
- Be able to determine and implement decontamination procedures.
- Have the ability to develop a site safety and control plan.
- Understand chemical, radiological, and toxicological terminology and behavior.

4.6 Employee Exposure Monitoring

4.6.1 Exposure monitoring at HAZWOPER sites will be conducted to determine explosive and oxygen levels, monitor and control employee exposures to airborne contaminants, and to determine and regulate controlled work area boundaries (e.g., support zone, contamination reduction zone, and exclusion zone) for the protection of non-HAZWOPER workers and the general public.

4.6.2 Direct Reading Exposure Monitoring Requirements

Explosive levels, oxygen levels, and airborne contaminants present potential hazards to HAZWOPER personnel working within controlled work areas and to non-HAZWOPER workers and the general public present outside the controlled work areas. On-site exposure monitoring will be utilized to assess the magnitude of these hazards and to provide indications of any necessary control procedures to mitigate unacceptable hazards. *S3NA-509-FM1 Direct Reading Instrument Monitoring Log* will be used to record all monitoring efforts using direct reading instruments and will remain part of the project file.

Specific exposure monitoring requirements will be established in individual HASPs, refer to *S3NA-602-PR1 Exposure Monitoring*, and will be implemented by the project team(s) subject to the following requirements:

- Direct reading instrumentation will be used in accordance with the following table:

Direct Reading Instrument	Example Trade Names	Use
Flame Ionization Detector (FID)	OVA	Detection of select organic vapors
Photo ionization detector (PID)	miniRAE, Micro-TIP	Detection of select organic vapors
Portable gas chromatograph	OVA	Detection of select organic vapors
Explosive meter	MSA ALTAIR, QRAE II, BW GasAlert	Determine explosiveness (as a percent of the Lower Explosive Limit [LEL])
Oxygen monitor	MSA ALTAIR, QRAE II, BW GasAlert	Determine oxygen concentration (in percent)
Single gas meters (mono-tox) <ul style="list-style-type: none"> • Hydrogen sulfide • Carbon monoxide • Oxides of nitrogen • Cyanide 		Determine airborne concentrations of selected contaminants (in parts per million)
Colorimetric Detector Tubes	Drager	Determine airborne concentrations of selected contaminants (in parts per million)
Aerosol monitor	Mini-RAM	Determine airborne particulate concentration (in milligrams per cubic meter)

- Selected instruments will be capable of discriminating contaminant concentrations to concentrations of at least one-half of the HASP-specified exposure limit. All direct-reading instrumentation will be calibrated daily as directed by the manufacturer. *S3NA-509-FM2 Instrument Calibration Log* will be used to record instrument calibrations.

4.6.3 Work Area Exposure Monitoring

- Work area exposure monitoring will include breathing zone readings for the maximum exposed worker(s).
- Results will be used to determine adequacy of PPE (especially respiratory protection). Specific criteria for upgrade/downgrade will be established in the HASP.

4.6.4 Perimeter Exposure Monitoring

- Perimeter air samples will be collected when the potential exists for airborne contaminants to migrate off-site.
- Perimeter exposure monitoring will be conducted at locations downwind from the project activities at a minimum (also upwind if the potential exists for offsite contamination to migrate onto the site).
- Sample results will be recorded in a log book or on the sample log form provided in *S3NA-509-FM3 Personal Sampling Data Sheet*
- Records will indicate individual name, SSN (last 4 digits is acceptable), and job/operation at the time of sample collection.
- Samples sent out for independent laboratory analysis will follow chain of custody requirements.
- Exposure results will be posted on site and explained in a safety briefing.

- **Employees** will receive a written statement of results within 15 days of receipt from the laboratory.
- Results of all personal exposure monitoring will be provided to the **SH&E department** for inclusion in the employee medical records, refer to *S3NA-604-PR1 Medical Records*.

5.0 Records

- 5.1 All forms and documents generated during a HAZWOPER project will be maintained in the project file.

6.0 Attachments

- 6.1 S3NA-509-FM1 Direct Reading Instrument Monitoring Log
- 6.2 S3NA-509-FM2 Instrument Calibration Log
- 6.3 S3NA-509-FM3 Personal Sampling Data Sheet
- 6.4 S3NA-509-FM4 Emergency Information and Hazard Assessment

Americas

Instrument Calibration Log

S3NA-509-FM2

Instrument Information	
Instrument Name:	Manufacturer:
Serial Number:	Last Service Date:
Parameter(s):	Calibration Gas:
Calibration Procedure:	
Daily Calibration Results	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	

Project:

Job No.:

Date:

Operator:

Instrument:

Calibration:

Americas

Emergency Information and Hazard Assessment

S3NA-509-FM4

Emergency References:**Ambulance:** 911**Fire:** 911**Police:** 911**Medical Services/Regional Hospital** (including a map is advisable):**Poison Control Center:** <http://www.aapcc.org/poison4.htm>**Emergency Muster Point:**

In case of a site/facility emergency, please meet at:

The escape route from the site and an emergency muster point will be determined and provided to all workers during the project mobilization.

Client Contacts:

Office: Cell:

AECOM Project Representatives:

Office: Mobile:

AECOM Medical Records and Medical Consultant

WorkCare

Anaheim, CA 94502

Telephone: 800-455-6155

Hearing Conservation

1.0 Purpose and Scope

- 1.1 Establishes procedures to confirm that personal noise exposure remains within acceptable limits and establishes the requirements of an acceptable hearing conservation program.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Decibel (dB)** – Logarithmic unit of measurement of sound level.
- 2.2 **Action Level** – An eight-hour, time-weighted average of 85 decibels measured on the A-scale, slow response, or equivalently; a noise dose of 50 percent.
- 2.3 **Standard Threshold Shift (STS)** – When one's hearing threshold has changed (relative to the baseline audiogram) an average of 10 dB or more at 2000, 3000, or 4000 Hz in either ear).
- 2.4 **Noise Reduction Rating (NRR)** – The measure, in decibels, of how well a hearing protector reduces noise, as specified by the Environmental Protection Agency.
- 2.5 **Time-Weighted Average Sound Level** – That sound level, which if constant over an 8-hour exposure, would result in the same noise dose as is measured.

3.0 References

- 3.1 S3NA-003-PR1 SH&E Training
- 3.2 S3NA-605-PR1 Medical Surveillance Program

4.0 Procedure

- 4.1 Roles and Responsibilities
 - 4.1.1 **Region SH&E Manager**
 - Provide access to initial and refresher hearing conservation training.
 - Inform employees of noise monitoring results when full-shift noise exposure is at or above the action level.
 - Designate areas and tasks where employees' exposure is at or above the action level.
 - Conduct noise monitoring, as applicable, and support hazardous noise assessment/evaluation efforts.
 - 4.1.2 **Project Manager / Office Managers (Operations)**
 - Implement the hearing conservation program.
 - Confirm that a hazardous noise assessment/evaluation has been conducted.
 - Confirm that a hazardous noise assessment/evaluation is conducted when a change in equipment, procedures, or personnel may increase employee exposure to noise.
 - Implement engineering controls to reduce noise levels when such measures are considered feasible and when required by regulation.
 - Purchase, monitor, and replenish for employees' use a supply of hearing protection devices with a minimum Noise Reduction Rating (NRR) of 26 dBA.

Confirm that individuals included in the program receive training and that the training meets the criteria outlined in this program.

- Investigate and implement corrective action to all reports of nonconformance with this procedure, including reports of standard threshold shifts or employees' failure to wear hearing protectors in designated areas. Maintain an awareness of the noise levels in work areas for which he/she is responsible.
- Place warning signs in areas where sound levels would require the use of hearing protectors.
- Request that a hazardous noise assessment/evaluation be conducted when a change in equipment, procedures, or personnel may increase employee exposure to noise.
- Confirm that all employees are aware of the requirements for hearing protection for any designated area or task.
- Enforce the use of hearing protection by employees in designated areas and for designated tasks.

4.1.3 Employee

- Comply with the requirements of the Hearing Conservation program.
- Wear hearing protection devices in designated areas or for designated tasks.
- Inspect and maintain hearing protection devices.
- Report any suspected change in noise levels of work area to supervisor.
- Report any signs or symptoms experienced that could be the result of overexposure to noise to supervisor.
- Participate in audiometric testing and hearing protection training when required.

4.2 General Requirements

4.2.1 The requirements of this procedure apply to all locations/facilities/projects where employee noise exposure may equal or exceed 50 percent of the allowable noise dose or Permissible Exposure Limit (PEL). Table 1 provides information relative to the current PEL for noise exposure expressed as a time-weighted average.

Table 1. Permissible Exposure Limit

SOUND LEVEL (dBA)	TIME (hours)
90	8
95	4
100	2
105	1
110	1/2
115	1/4 or less

4.2.2 Table 2 provides information relative to the Action Level (or 50 percent allowable noise dose) expressed as a time-weighted average. The action levels outlined in the table below and PELs described in Table 1 are calculated without regard to the protection afforded by the use of hearing protectors.

Table 2. Action Levels for Hearing Conservation Program

SOUND LEVEL (dBA)	TIME (hours)
85	8
90	4
95	2
100	1
105	1/2
110	1/4 or less

4.3 Training

4.3.1 All employees with potential exposure above the action levels established in Table 2 of this procedure or who otherwise utilize any type of hearing protector will participate in a hearing conservation training program.

4.3.2 The initial and subsequent annual hearing conservation training will address, at a minimum, the following topics:

- The effects of noise on hearing, recognizing hazardous noise, and symptoms of overexposure to hazardous noise.
- When and/or where hearing protectors are required to be worn.
- The purpose of hearing protectors.
- The advantages, disadvantages, and effectiveness of various types of protectors.
- Instructions on how to select, use, fit, and care for hearing protectors.
- The purpose of audiometric testing, including an explanation of the test procedures.
- Hearing Conservation Program requirements and responsibilities.

4.3.3 Hearing protection training is conducted annually for all affected employees or more frequently for employees who do not properly use hearing protectors or otherwise fail to comply with this policy.

4.4 Audiometric Testing

4.4.1 All AECOM personnel with exposure greater than the action level shall be enrolled in the medical surveillance program and undergo a baseline audiogram within 6 months of the first exposure. Thereafter, annual audiograms will be compared with the baseline exam.

4.4.2 Enrolled employees will receive audiograms during their exit physicals; refer to *S3NA-605-PR1 Medical Surveillance Program*.

4.4.3 When a Standard Threshold Shift (STS), as identified by the AECOM Medical Consultant, is noted between the last valid baseline and the annual audiogram, the following steps will be taken:

- A retest will be conducted within 30 days to confirm the STS. The employee will not be exposed to workplace/hobby noise for 14 hours or will be provided with adequate hearing protection prior to testing.
- If the STS persist, ear protection will be upgraded to one with a greater NRR. The minimum NRR will be 26 dBA.
- The employee will be counseled and AECOM will obtain information regarding the employee's possible noise exposure away from the workplace or existing ear pathology.

- Qualified medical personnel will review the audiograms. This group will determine the need for a medical referral.
- The employee will be notified in writing by either the **Region SH&E Manager** or the AECOM Medical Provider of the STS, within 21 days of determination, as required by regulation.
- The employee's supervisor will be notified of the shift in hearing threshold.

4.4.4 If the employee who has experienced a STS is exposed to 85 dBA for eight hours or 80 dBA for 12 hours, mandatory use of ear protection is required.

4.5 Monitoring of Noise Levels

4.5.1 When information indicates that any employee's exposure may equal or exceed the action level as specified in Table 2, the **Region SH&E Manager** shall develop and implement a monitoring program to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

4.6 Hearing Protectors

4.6.1 Selection of appropriate hearing protectors must be based on actual or anticipated exposure levels. At a minimum, hearing protectors must provide a level of protection that brings actual or anticipated exposure below the PEL established for the time period shown in the table above. Additional information relative to hearing protector use is as follows:

- Hearing protection will be mandatory for all employees exposed to 85 dBA for eight hours.
- Hearing protection will be mandatory for all employees working in any area that has not been evaluated for noise exposure and the ambient noise level in the area is such that you must raise your voice to have a normal conversation with someone less than three feet from you and/or when within 25 feet of an operating piece of heavy equipment.
- Hearing protection will be mandatory for all employees who work on or near heavy equipment unless personal dosimetry or other techniques have been used to document actual exposure.
- Hearing protectors will be made available to all employees at no cost to the employees who may be exposed to 85 dBA for eight hours.
- Hearing protection will be mandatory for all employees exposed to 85 dBA for any period of time and who have experienced an STS.

5.0 Records

- 5.1 Noise exposure measurement records will be retained for two years at the project/facility.
- 5.2 Audiogram records will be retained in the employee's medical records as per *S3NA-605-PR1 Medical Surveillance Program*.
- 5.3 Employee training session documentation will be retained in accordance with *S3NA-003-PR1 SH&E Training*.

6.0 Attachments

- 6.1 S3NA-510-WI1 Hearing Protection Guidelines
- 6.2 S3NA-510-FM1 Site-Specific Hearing Conservation Program

Hearing Protection Guidelines

1.0 Comparison

Comparison of Hearing Protection	
Ear Plugs	Ear Muffs
<p>Advantages:</p> <ul style="list-style-type: none"> • small and easily carried • convenient to use with other personal protection equipment (can be worn with ear muffs) • more comfortable for long-term wear in hot, humid work areas • convenient for use in confined work areas 	<p>Advantages:</p> <ul style="list-style-type: none"> • less attenuation variability among users • designed so that one size fits most head sizes • easily seen at a distance to assist in the monitoring of their use • not easily misplaced or lost • may be worn with minor ear infections
<p>Disadvantages:</p> <ul style="list-style-type: none"> • requires more time to fit • more difficult to insert and remove • require good hygiene practices • may irritate the ear canal • easily misplaced • more difficult to see and monitor usage 	<p>Disadvantages:</p> <ul style="list-style-type: none"> • less portable and heavier • more inconvenient for use with other personal protective equipment • more uncomfortable in hot, humid work area • more inconvenient for use in confined work areas • may interfere with the wearing of safety or prescription glasses; wearing glasses results in breaking the seal between the ear muff and the skin and results in decreased hearing protection

2.0 Care and Use

- 2.1 Follow the manufacturer's instructions.
- 2.2 Check hearing protection regularly for wear and tear.
- 2.3 Replace ear cushions or plugs that are no longer pliable.
- 2.4 Replace a unit when head bands are so stretched that they do not keep ear cushions snugly against the head.
- 2.5 Disassemble ear muffs to clean.
- 2.6 Wash ear muffs with a mild liquid detergent in warm water, and then rinse in clear warm water. Sound-attenuating material inside the ear cushions must not get wet.
- 2.7 Use a soft brush to remove skin oil and dirt that can harden ear cushions.
- 2.8 Squeeze excess moisture from the plugs or cushions and then place them on a clean surface to air dry.

Americas

Site-Specific Hearing Conservation Program

S3NA-510-FM1

_____ **Site (Project)**

1.0 Monitoring

As per regulation, noise monitoring will be conducted by the following procedure:

Such monitoring will consist of (*check those that apply*):

- Noise Dosimetry Sound Level Meter Survey

Specific instrumentation to be used is (make/model):

Make	Model

and will be calibrated at a frequency of _____ and documented in the _____.

Monitoring strategy is as follows (*list all equipment and activities on site that may involve sound pressure levels above 80 dBA and an explanation of the strategy to document actual exposures*):

Area/Equipment	Monitoring Strategy

Where areas or equipment are not clearly identified, all monitoring will be documented utilizing an illustrated layout (*attach form developed for the specific site*). Monitoring frequency will be in accordance with the strategy outlined above and when the following changes in site conditions/activities occur:

1.
2.
3.
4.
5.

2.0 Employee Notification

All site employees exposed above the regulated action level (85 dBA – 8 hour TWA) will be notified of the monitoring results by *(insert name/title)* _____ at an interval not to exceed _____ after completion of monitoring.

Notification shall be written, with a copy to the SH&E Department. Documentation of employee notifications and corresponding signatures of notified employees will be kept in the site health and safety logbook/files.

3.0 Observation of Monitoring

All employees affected by the monitoring, or a designated employee representative, shall be given the opportunity to observe noise monitoring procedures. This will be achieved by:

4.0 Audiometric Testing Program and Requirements

AECOM employees who perform field activities where noise exposure above action levels is expected are required to participate in an audiometric testing program. Additionally, any subcontractors performing work on AECOM projects where noise levels exceeding action level will be required to provide documentation that they participate in an audiometric testing program that meets the applicable regulations. Documentation of participation in the testing program will be maintained by _____ and will be located at _____.

5.0 Hearing Protectors and Estimating Attenuation

A selection of suitable hearing protectors will be made available to all employees who are expected to have 8-hour TWA noise exposures above 85 dBA. The types anticipated to be available include:

Protection Type	Attenuation

Hearing protector attenuation will be evaluated by _____ for specific noise environments according to the following method prior to determining their suitability for use:

1.
2.
3.

The following site employees will be required to wear hearing protectors during specific activities and the results of site-specific monitoring conducted in accordance with this procedure. *(This section can be completed after monitoring, if necessary).*

Employee Name	Activity Type	Type of Protection

Hearing protectors will be properly fitted by _____ upon initial distribution to site workers.

Training in the use and care of hearing protectors shall be conducted by _____ during the initial site-specific health and safety training. Training contents shall meet the requirements set forth in this procedure and the applicable regulations.

Hearing protectors will be distributed by _____ from the storage location at the _____.

6.0 Access to Information and Training Materials

All information required by regulation to be made available to the employees will be posted by *(insert name/title)* _____ at the _____.

Local Occupational Health and Safety Regulations will also be kept on site.

7.0 Recordkeeping

Records required by AECOM's Hearing Conservation Program and Regulations shall be completed by _____ and shall be maintained at the _____ and placed on permanent file at the _____ for the minimum duration required by the standard. Employees can access their individual records by contacting _____.

All records required by this section will be transferred to any employee's successive employer if AECOM ceases to do business.

8.0 Approvals

Project Manager: _____ Date: _____

SH&E Representative: _____ Date: _____

Heat Illness Prevention

1.0 Purpose and Scope

- 1.1 Establishes a Heat Illness Prevention Program to help ensure that employees know and recognize the symptoms of heat stress-related illnesses and are prepared to take appropriate corrective action.
- 1.2 This procedure applies to all AECOM Americas-based employees and operations.

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 light that is damaging to the skin. 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 S3NA-003-PR1 SH&E Training
- 3.2 S3NA-004-PR1 Incident Reporting (Americas)
- 3.3 S3NA-203-PR1 Emergency Response Planning, Field
- 3.4 S3NA-208-PR1 Personal Protective Equipment
- 3.5 S3NA-209-PR1 Project Hazard Assessment and Planning
- 3.6 [American Conference of Governmental Industrial Hygienists \(ACGIH\)](#)

4.0 Procedures

- 4.1 Roles and Responsibilities
 - 4.1.1 **Project 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 **Region Safety, Health and Environment (SH&E) Manager**

- Provide heat illness awareness training.
- Assist project teams 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.
- Ensure that Employees have been trained on the recognition of heat illness.
- Ensure that adequate supplies of appropriate fluids are readily available to Employees.
- Ensure that a proper rest area is available.
- Conduct heat illness monitoring, as applicable.
- Implement the work-rest schedule.
- Ensure that first aid measures are implemented once heat stress symptoms are identified.
- Ensure 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. Employees shall not be exposed to levels that exceed those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard. Also refer to the *S3NA-511-ST Heat Exposure* standards.

4.2.2 Clothing corrections shall be applied in accordance with the heat stress and strain section of the ACGIH Standard.

4.3 Exposure Controls

4.3.1 If **Employees** are or may be exposed, the **Supervisor** shall:

- Conduct a heat stress assessment to determine the potential for hazardous exposure of Employees, and
- Develop and implement a heat stress exposure control plan within the Safe Work Plan or Task Hazard Analysis, refer to *S3NA-209-PR1 Project Hazard Assessment and Planning*.

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 listed in

the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard.

- 4.3.3 If engineering controls are not practicable, the **Supervisor** shall reduce the exposure of **Employees** to levels below those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard 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, potable water close to the work area for the use of a heat exposed **Employee**.
- 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 *S3NA-511-WI2 Symptoms and Treatment* for more specifics.
- 4.4 Heat Stress Planning
- 4.4.1 Heat stress can be a significant field site hazard, especially for Employees wearing CPC. To prepare the field for emergency response planning, refer to *S3NA-203-PR1 Emergency Response Planning, Field* procedure. The project and site specific risks need to be planned using a Safe Work Plan or Task Hazard Analysis, refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning* procedure.
- 4.4.2 The workforce will gradually work up to a full workload under potentially stressful conditions to allow for proper acclimation.
- 4.4.3 **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** must be encouraged to immediately report any heat stress that they may experience or observe in fellow **Employees**. **Supervisors** must use such information to adjust the work-rest schedule to accommodate such problems.
- 4.4.4 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** must 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 **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.
- 4.5.2 Anyone exhibiting symptoms of heat stroke (red dry skin, or unconsciousness) must be taken immediately to the nearest medical facility. Steps must be taken to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).
- 4.5.3 Severe heat stress (heat stroke) is a life-threatening condition that must be treated by a competent medical authority.
- 4.6 Prevention
- 4.6.1 All **Employees** working in extreme heat or sun should understand the following guidelines for preventing and detecting heat exhaustion and heat stroke.
- 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.
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
- Avoid sudden changes of temperature, refer to *S3NA-511-WI1 Temperature Thresholds*.
- Air out a hot vehicle before getting into it.
- If you take diuretics, ask your doctor about taking a lower dose during hot weather.
- 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 *S3NA-511-GL1 Dehydration Chart*.

4.6.2 Personal Protective Equipment

- Review the *S3NA-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

- 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.
- Additional salt is usually not needed and salt tablets should not be taken.
- Replacement fluids should be cool, but not cold.
- Breaks will be taken in a cool, shaded location, and any impermeable clothing should be opened or removed.
- Dry clothing or towels will be available to minimize chills when taking breaks.
- Manual labor will not be performed during breaks, other than paperwork or similar light tasks.
- Other controls that may be used include:
 - Scheduling work at night or during the cooler parts of the day (6 a.m.–10 a.m., 3 p.m.–7 p.m.).
 - Erecting a cover or partition to shade the work area.
 - Wearing cooling devices such as vortex tubes or cooling vests beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

4.8 Evaluating the Work-Rest Schedule's Effectiveness

- 4.8.1 Once a work-rest schedule is established, the **Supervisor** must continually evaluate its effectiveness through observation of **Employees** for signs/symptoms of heart stress. Measurement of each employee's vitals (e.g., pulse, blood pressure, and temperature) can provide additional information in determining if the schedule is adequate, and is accomplished as follows:

- 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 and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:
 - Each employee's maximum heart rate at the start of any break should be a bpm of less than 180 minus employee's age. If this value is exceeded for any **Employee**, the duration of the following work period will be decreased by at least 10 minutes.
 - At the end of each work period, all employees' heart rates must have returned to within +10% of the baseline pulse rate. If any employee's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be remeasured and the end-of-break criteria again applied.
- Use a clinical thermometer or similar device to measure the oral/ear temperature at the beginning (before drinking liquids) and end of each break period and apply the following criteria:
 - If the oral temperature exceeds 99.6 degrees Fahrenheit (°F) (36.6 degrees Celsius [°C]), shorten the next work cycle by one-third without changing the rest period.
 - If the oral temperature still exceeds 99.6°F (36.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.
- 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 remeasured and the end-of-break criteria again applied.

4.8.2 All physiological monitoring of heat stress will be documented using *S3NA-511-FM1 Heat Stress Monitoring Log*.

4.9 Provision of Water

4.9.1 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.

4.10 Training

4.10.1 **Employees** and their **Supervisors** that may be exposed to the hazard will be oriented to the hazard and the controls prior to work commencing.

4.10.2 Those **Employees** potentially exposed to heat stress will receive training, refer to the *S3NA-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;
 - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.
 - 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 *S3NA-004-PR1 Incident Reporting (Americas)* procedure.

5.0 Records

5.1 None

6.0 Attachments

- 6.1 S3NA-511-WI1 Temperature Thresholds
- 6.2 S3NA-511-WI2 Symptoms and Treatment
- 6.3 S3NA-511-FM1 Heat Stress Monitoring Log
- 6.4 S3NA-511-GL1 Dehydration Chart
- 6.5 S3NA-511-ST Heat Exposure

Temperature Thresholds

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 must 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 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.

1.2.2 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 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 (ignore if indoors or wearing CPC)	
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 (ignore if wearing CPC)	
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)

¹ This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

Level B with airline system	+9°F (+5.56°C)
Level B with SCBA	+9°F (+5.56°C) and right one column ²
Level A	+14°F (+7.78°C) and right one column ²
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)

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.

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.

Symptoms and Treatment

1.0 Heat Illness Symptoms

1.1 The following are three stages of heat-related illness:

1.1.1 Heat Cramps

Heat cramps are painful muscle cramps caused by over-exertion in extreme heat. Symptoms include:

- Muscle spasms; and
- Pain in the hands, feet, and abdomen.

1.1.2 Heat Exhaustion

Heat exhaustion is the next stage. 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

1.1.3 Heat Stroke

Heat exhaustion can sometimes lead to heat stroke, which can be fatal and requires emergency treatment. Heat stroke happens when you stop sweating and your body temperature continues to rise, often to 105 degrees Fahrenheit (°F) (40.5 degrees Celsius [° C]) or higher. 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 Cramps

2.1.1 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.
- Seek medical attention if symptoms are not alleviated or if more serious problems are indicated.

2.1.2 Heat Exhaustion

Treatment of heat exhaustion includes:

- Get out of the sun to a cool location and drink lots of water, a little at a time.
- Remove or loosen tight clothing.
- If you are nauseated or dizzy, lie down.
- Move the victim to a cool place.
- Remove as much clothing as possible and elevate the feet.
- Administer drinks of cool water and fan to cool.
- Seek medical attention immediately.

2.1.3 Heat Stroke

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:
 - Apply cool (not cold) water the person's whole body, then fan the person.
 - Wrap in wet sheet.
 - If available, use cold packs under arms, neck, and ankles
 - Stop cooling once the person's temperature appears to be down; be careful not to overcool.
- 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.

Americas

Heat Stress Monitoring Log

S3NA-511-FM1

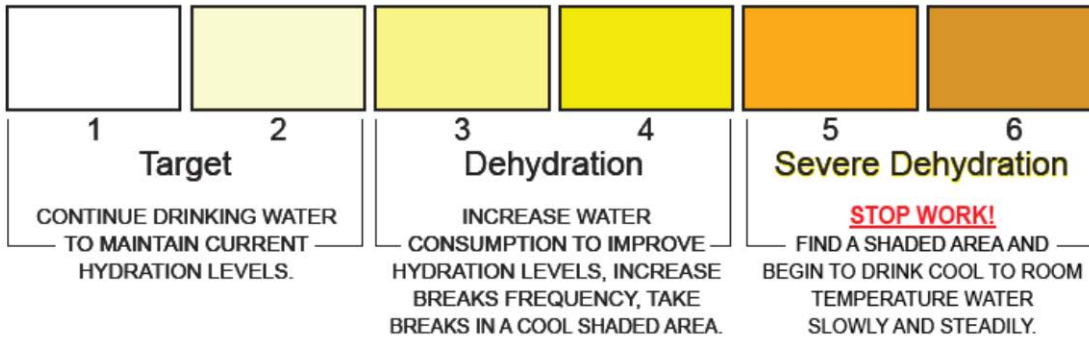
The purpose of this form is to monitor employees for heat illness. It is the responsibility of the Foreman or Supervisor-in-Charge to ensure that each person completes the required information.

Project Name:			Foreman/Supervisor:						Work/Rest Schedule1: IN (min)			OUT (min)				
Date:	Water Provided ¹		Acclimated ²		Initial Vitals ³	Vital Signs and Time In/Out ³			Celcius/ Farenheit (circle one)							
Employee Name	Yes	No	Yes	No	Vitals	In	Out	Vitals	In	Out	Vitals	In	Out	Vitals	In	Out
					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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					P			P			P			P		
					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 7 to 10 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 7- to 10-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.

GUIDANCE TOOL FOR MONITORING DEHYDRATION

URINE COLORATION CHART



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 Illness Prevention

S3NA-511-ST1

The following Occupational Health and Safety regulations apply directly to heat stress hazards:

Jurisdiction	Regulation
United States	
OSHA	1910.132
California	8 California Code of Regulations 3395
Canada	
Alberta	n/a
British Columbia	OHS Regulation (1997) Sect 7.28 – 7.32, 8.21, 12.72, 12.73
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 4.12, 4.13
New Brunswick	OHS Regulation (91-191) Sect 44
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 10
Nova Scotia	n/a
NWT/NU Territories	n/a
Ontario	O. Reg. 213/91 Sect 112 O. Reg. 851 Sect 129 Heat Stress (Health and Safety Guidelines) (April 2003)
Prince Edward Island	OHS Regulations (EC180/87) Sect 42.1
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 121 – 124, Schedule 4, Schedule 5
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 70
Yukon Territory	Occupational Health Regulations (O.I.C. 1986/164) Sect 9, 12

Respiratory Protection Program

1.0 Purpose and Scope

- 1.1 This procedure establishes a written respiratory protection program with the required elements and work site-specific procedures for respirator selection, use, and maintenance for any workplace where respirators are necessary to protect the health of an Employee.
- 1.2 Prior to implementation of this program, the primary objective shall be to prevent atmospheric contamination as far as feasible by accepted engineering control measures (e.g. enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials).
- 1.3 This procedure applies to all AECOM Americas-based employees and operations, except where local or governmental regulations are more stringent.

2.0 Terms and Definitions

- 2.1 **Air-purifying respirator** – A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.
- 2.2 **Approved** – Equipment tested and listed by the Bureau of Mines, jointly by the Mining Enforcement and Safety Administration (MESA), and the National Institute for Occupational Safety and Health (NIOSH), or jointly by the Mine Safety and Health Administration (MSHA) and NIOSH.
- 2.3 **Assigned protection factor (APF)** – The ratio of the ambient concentration of an airborne substance (outside the respirator) to the concentration of the substance inside the respirator.
- 2.4 **Atmosphere-supplying respirator** – A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere, including supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.
- 2.5 **Breakthrough** – The first perception of an odor, taste or irritation experienced while wearing an air-purifying respirator. Breakthrough is generally an indication that the cartridges are saturated and are no longer filtering out the contaminant. Breakthrough can also be an indication of an improperly functioning respirator.
- 2.6 **CNP** – Controlled Negative Pressure testing protocol
- 2.7 **Filtering facepiece (dust mask)** – A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.
- 2.8 **Fit factor** – A quantitative estimate of the fit of a particular respirator to a specific individual, typically estimating the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.
- 2.9 **Fit test** – The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test [QLFT] and Quantitative fit test [QNFT].)
- 2.10 **Hazardous atmosphere** – Any atmosphere, either immediately or not immediately dangerous to life or health, that is oxygen-deficient or that contains a toxic or disease-producing contaminant exceeding the legally established permissible exposure limit (PEL) or, where applicable, the Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists.
- 2.11 **Immediately dangerous to life or health (IDLH)** – An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
- 2.12 **Maximum use concentration (MUC)** – The assigned protection factor (APF) of an approved respirator assembly times the PEL: $MUC = APF \times PEL$

- 2.13 **Negative pressure respirator (tight fitting)** – A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.
- 2.14 **Oxygen-deficient atmosphere** – An atmosphere with oxygen content below 19.5 percent by volume.
- 2.15 **Physician or other licensed health care professional (PLHCP)** – An individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the health care services required by local or governmental respiratory protection standards.
- 2.16 **Positive pressure respirator** – A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.
- 2.17 **Powered air-purifying respirator (PAPR)** – An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.
- 2.18 **Pressure demand respirator** – A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.
- 2.19 **Qualitative fit test (QLFT)** – A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.
- 2.20 **Quantitative fit test (QNFT)** – An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.
- 2.21 **Self-contained breathing apparatus (SCBA)** – An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.
- 2.22 **Supplied-air respirator (SAR) or airline respirator** – An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.
- 2.23 **Tight-fitting facepiece** – A respiratory inlet covering that forms a complete seal with the face.
- 2.24 **User seal check** – An action conducted by the respirator user to determine if the respirator is properly sealed to the face.

3.0 References

- 3.1 Canadian Standards Association (CSA), Z180.1-00, Compressed Breathing Air and Systems
- 3.2 CSA, Z94.4-02, Selection, Use and Care of Respirators
- 3.3 Occupational Safety and Health Administration (OSHA), Title 29 Code of Federal Regulation (CFR), Part 1910.134, Respiratory Protection
- 3.4 OSHA, 29 CFR 1926.103, Respiratory Protection
- 3.5 S3NA-003-PR1 SH&E Training
- 3.6 S3NA-506-PR1 Compressed Gases
- 3.7 S3NA-604-PR1 Medical Records
- 3.8 S3NA-605-PR1 Medical Surveillance Program

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Respiratory Protection Program Administrator

The Americas Safety, Health and Environment (SH&E) Director is the Respiratory Protection Program Administrator.

- Verify full compliance with this standard operating procedure (SOP).

- Determine the need for medical evaluations or any other additional medical attention related to the use of a respirator.
- Perform the program evaluations described in this SOP.

4.1.2 **Office Manager (Operations) / Project Manager /Supervisor**

- Verify compliance with the respiratory protection program set forth in this procedure.
- Verify that only those employees who are medically qualified, properly trained, and fit tested are assigned to respirator work.
- Verify that respirators are provided, repaired, or replaced as may be required due to wear and deterioration.

4.1.3 **Site Safety Officer**

- Confirm that the service is available to respond prior to any employees entering the IDLH area.

4.1.4 **Region SH&E Manager**

- Monitor compliance with the various aspects of this program.
- Provide technical assistance regarding respirator selection and use, evaluate the effectiveness of this program, and support respirator training and fit testing.
- Audit company compliance with this procedure.

4.1.5 **Employee**

- Use respiratory protection in accordance with instructions and training received.
- Maintain the respirator in accordance with this SOP and the manufacturer's instructions.
- Immediately report any malfunction of the respirator to the Supervisor or Project Manager or other responsible person.

4.2 Training

4.2.1 **Employees** who wear respiratory protection must receive training before they are assigned to a task that requires the use of respiratory protection.

4.2.2 **Employees** that may be exposed to a respiratory hazard will be oriented to the hazard and the controls prior to beginning work.

4.2.3 Atmospheric testing will be carried out by someone trained in the use, calibration, and interpretation of the test equipment.

4.2.4 Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the Employee's knowledge or use of the respirator indicate that the Employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to verify safe respirator use.

4.2.5 **Basic Respirator Training Program**

Respirator training classes will include, at a minimum, the following:

- Instruction in the nature of the respiratory hazards, whether acute, chronic, or both, and a description of potential health effects if the respirators are not used;
- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- The limitations and capabilities of the respirator;

- Proper fitting, including demonstrations and practice in wearing, adjusting, determining the fit of, and performing a user seal check (in accordance with *S3NA-519-WI1 Fit Testing Protocol*, *S3NA-519-FM1 Respiratory Equipment Fit Test* and *S3NA-519-WI2 User Seal Check Procedures*) each time respirator is donned;
- How to inspect, put on, use and remove the respirator;
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
- The procedures for maintenance and storage of the respirator;
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
- The general requirements of local or governmental Respiratory Protection Standards.

4.3 Medical Surveillance

- 4.3.1 No **Employee** shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator.
- 4.3.2 Prior to wearing a respirator, **Employees** will complete an initial baseline medical surveillance examination performed by a PLHCP in accordance with the requirements of *S3NA-605-PR1 Medical Surveillance Program*.
- 4.3.3 Additional medical examinations will be provided to employees who wear respirators when:
- An **Employee** reports medical signs or symptoms that are related to ability to use a respirator;
 - A **PLHCP, Supervisor, or the Respiratory Protection Program Administrator** determines that an Employee needs to be reevaluated;
 - Information from the Respiratory Protection Program, including observations made during fit testing and program evaluation, indicates a need for Employee reevaluation; or
 - A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature, etc.) that may result in a substantial increase in the physiological burden placed on an **Employee**.
- 4.3.4 All medical surveillance examinations shall occur during normal working hours; shall be convenient, understandable, and confidential; and the **Employee** will be given chance to discuss results with examining physician.

4.4 Respirator Selection

- 4.4.1 **Project Managers** shall select and provide an appropriate respirator based on the respiratory hazard(s) to which the **Employee** is exposed and workplace or user factors that may affect respirator performance and reliability.
- 4.4.2 **Project Managers** shall identify and evaluate the respiratory hazard(s) in the workplace. Evaluations shall include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form.
- 4.4.3 Where the employee exposure cannot be identified or reasonably estimated, the atmosphere shall be considered IDLH.
- 4.4.4 Only approved respirators shall be selected and they shall be used in compliance with the conditions of their certification.
- 4.4.5 Respirators shall be selected from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

4.5 Fit Testing Procedures

- 4.5.1 **Employees** using a tight-fitting respirator shall pass an appropriate QLFT or QNFT prior to initial use of the respirator, whenever a different respirator facepiece (size, style, model or make) is used, and at least annually thereafter.
- 4.5.2 Additional fit tests will be performed:
- Whenever there is an indication that changes in the **Employee's** physical condition might have an effect on respirator fit (such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight);
 - If the **Employee** notifies his/her **Supervisor** or **Region SH&E Manager** that the fit of his/her respirator is unacceptable.
- 4.5.3 The fit test shall be administered using a QLFT or QNFT protocol accepted by local or governmental regulations.
- 4.5.4 QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.

4.6 Interference with Gas-Tight Seal

- 4.6.1 The employer shall not permit respirators with tight-fitting facepieces to be worn by **Employees** who have:
- Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or
 - Any condition that interferes with the face-to-facepiece seal or valve function.
- 4.6.2 If an **employee** wears corrective glasses or goggles or other personal protective equipment, the **Supervisor** or **Project Manager** shall ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.
- 4.6.3 **Employees** shall perform a user seal check each time they don the respirator.

4.7 Specification of Proper Level of Respiratory Protection

- 4.7.1 The **Region SH&E Manager** or his/her designated and qualified representative shall provide guidance on the proper selection and use of all respiratory protective devices, including half-face and full-face air purifying respirators, airline respirators, and self-contained breathing apparatus. This information is generally specified as part of the written site-specific Health and Safety Plan (HASP).
- 4.7.2 **Employees** engaged in activities not covered by a HASP must consult with the **Region SH&E Manager** or his/her designated representative to determine the proper equipment prior to use. Whenever appropriate, exposure levels will be measured to verify that the actual use conditions are within the limitations of the approvals specified by NIOSH/MSHA for the selected respirator.

4.8 Change Out Schedule

Filter cartridges shall be changed out whenever an increase in breathing resistance is detected by the user.

- 4.8.1 When available, chemical cartridges that are equipped with end-of-service life indicators (ESLI) shall be utilized. In those cases, cartridges should be changed when indicated by the ESLI.
- 4.8.2 In the absence of cartridges equipped with an ESLI, **employees** shall change chemical cartridges on the following schedule:
- Immediately if breakthrough is perceived; and
 - In accordance with the change out schedule based upon the anticipated contaminant concentration, environmental conditions, employee work rate, and the specific data provided by manufacturer.

- 4.8.3 When PAPRs are worn, the same rules apply with the exception that filter cartridges should be changed when airflow through the filter elements decreases to an unacceptable level, as indicated by the manufacturer's test device.
- 4.9 Air-Supplying Respirator Use
- 4.9.1 Air-supplying respirators will be specified for use when it has been determined that any of the following conditions exist:
- The oxygen concentration is less than 19.5 percent;
 - The contaminant is unknown or its concentration cannot be quantified;
 - The airborne contaminant concentration is above its IDLH;
 - An air-purifying respirator canister or cartridge that removes the contaminant is not available;
 - The contaminant concentration is above the concentration for which an air-purifying canister or cartridge is approved; or
 - The contaminant concentration is above the MUC of a full-face air-purifying respirator.
- 4.9.2 No **Employee** may engage in an operation requiring the use of an air-supplied respirator unless the **Region SH&E Manager** has reviewed the operation and approved its use.
- 4.9.3 The determination of the type of air-supplying respirator (i.e., SCBA, airline, demand, pressure demand, etc.) which is appropriate for the job, outside standby persons, communication, proper training and equipment, notification procedures, and necessary action all require planning. Mandatory equipment including SCBA or SAR with auxiliary air supply and emergency appropriate retrieval equipment or equivalent rescue means will be made by the **Region SH&E Manager** or his/her designated representative at the time of review. The need for any additional precautions (i.e., equipment specific training, on-site health and safety support, etc.) will also be determined by the **Region SH&E Manager**.
- 4.10 Minimum Procedures for IDLH atmospheres
- 4.10.1 One **Employee** or, when needed, more than one **Employee** shall be located outside the IDLH atmosphere. This **employee** shall be responsible for communicating with the **Employees** in the IDLH atmosphere, alerting rescue services if needed, and restricting entrance to the IDLH area by untrained and unapproved persons.
- 4.10.2 Visual, voice, or signal line communication shall be maintained between the **Employee(s)** in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.
- 4.10.3 The **Employee(s)** located outside the IDLH atmosphere shall be trained and equipped to provide effective emergency rescue or to initiate on-site rescue services.
- 4.10.4 If on-site rescue services are to be used, the **Site Safety Officer** shall confirm that the service is available to respond prior to any employees entering the IDLH area.
- 4.10.5 **Employee(s)** located outside the IDLH area and/or on-site rescue services shall be equipped with:
- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
 - Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
 - Equivalent means for rescue where retrieval equipment would create a hazard to the Employees in the IDLH area.

4.11 Breathing Air

- 4.11.1 Compressed air used for respiration shall be of high purity and shall meet, as a minimum, the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Specification G-7.1 (ANSI Z86.1).
- 4.11.2 Oxygen shall NOT be used as a source of breathing air at any time in open-circuit SCBAs or airline respirators.
- 4.11.3 Compressor Supplied Breathing Air

All compressors used for filling SCBA air cylinders or for supplying airline respirators shall be equipped with the following safety and standby devices:

- The compressor intake shall be located to verify that only respirable (uncontaminated) air is admitted. This requires attention to the location of the compressor intake with respect to compressor engine exhaust, chemical storage or use areas, and suitable intake screening or filtration.
- Alarms to indicate compressor failure (such as low-pressure air horns, etc.) shall be installed in the system.
- A receiver of sufficient capacity to enable the respirator wearer to exit from a contaminated atmosphere shall be provided.

If an oil-lubricated compressor is used to supply breathing air, it shall be equipped with both of the following devices:

- A continuous reading carbon monoxide monitoring system set to alarm should the carbon monoxide concentration exceed 10 parts per million; and,
- A high temperature alarm which will activate when the discharge air exceeds 110 percent of the normal operating temperature in degrees Fahrenheit.

An in-line purifying filter assembly to remove oil, condensed water, particulates, odors, and organic vapors shall be used in conjunction with the air compressor.

- 4.11.4 Routine inspection and maintenance of air compressor shall be performed and documented with the *S3NA-519-FM3 Respiratory Equipment Inspection*. Compressed Air Cylinder Systems for Airline Respirators
- Compressed Air Cylinders shall meet the requirements of S3NA-506-PR1 Compressed Gases
 - Compressed air cylinder systems used to supply airline respirators shall be equipped with low pressure warning bells (e.g., Scott Pak-Alarm) or similar warning devices to indicate air pressure in the manifold below 500 pounds per square inch (psi). When such systems are used, one **employee** shall be assigned as safety standby within audible range of the low pressure alarm.
 - Airline hose couplings shall be incompatible with outlets for other gas systems to prevent inadvertently supplying airline respirators with nonrespirable gases or oxygen.
 - The air pressure at the hose connection to airline respiratory equipment shall be within the range specified in the approval of the equipment by the manufacturer.
- 4.11.5 Compressed Air Cylinder Systems for Recharging SCBAs
- When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3,000 psi.
- 4.11.6 Escape/Egress Units
- Escape/egress unit respirators are intended for use in areas where escape with a short-term (5 minutes) air supply is necessary.

- They may be used as adjuncts to airline pressure demand respirators as a backup air supply or as independent emergency devices in areas where respiratory protection is not normally required.
- Appropriate training shall be conducted and documented prior to assigning **Employees** to tasks or locations subject to the use of these respirators.
- Escape/egress units (5 minutes) shall never be used to enter a hazardous atmosphere or as primary standby respirators for confined space entry.

4.12 Respirator Inspection, Cleaning, Maintenance, and Storage

When respirator use is required, only properly cleaned and maintained NIOSH/MSHA approved respirators shall be used.

4.12.1 Inspection

- Respirators should be inspected before and after use. Those for emergency use should be inspected once per month.
- All connections, including gaskets, o-rings should be checked for damage and tightness.
- The facepiece should be inspected for cracks and rubber or elastomer parts should be checked for deterioration and pliability.
- All respirators shall be inspected routinely by the user before, during, and after each use. Defects shall be reported to their **Supervisor** or **Project Manager**. No defective respirator shall be issued or worn.
- Routinely used respiratory equipment shall be inspected by an individual qualified by experience or training to do the work.

4.12.2 Cleaning and Maintenance

- Respirator facepiece assemblies shall be cleaned and sanitized minimally after each day of use in accordance with the requirements specified in *S3NA-519-WI3 Respirator Cleaning Procedures*.
- Respiratory equipment shall not be passed from one person to another until it has been cleaned and sanitized.
- Respiratory equipment shall be maintained according to manufacturer's instructions.
- Where respirators are assigned to individual employees, management shall verify compliance with cleaning and maintenance requirements by periodic inspection and field audits of respiratory equipment and document is with the *S3NA-519-FM2 Respiratory Equipment Maintenance Log*.
- The respirator should then be inspected for any damaged parts (repair should only be done by trained personnel with the proper tools) and cleaned with a hot water/mild detergent solution.
- In field situations, a premoistened towelette (e.g., baby wipes) can be used. The mask should then be rinsed with clean warm water and dried.
- Alcohol should never be used to clean masks as it can damage the facepieces and rubber parts.

4.12.3 Storage

- Store clean respirators so that they are protected from dust, excessive moisture, damaging chemicals, temperature extremes and direct sunlight. They should be placed in a sealed plastic bag and stored in the original box.

4.13 Hygiene

Employees must leave the work area to wash, change cartridges, or if they detect breakthrough or resistance.

4.14 Costs

The costs for training, medical examinations, fit testing, respirators, and cleaning materials should be considered as operational costs.

4.15 Program Evaluation

4.15.1 The **Region SH&E Manager** will conduct evaluations of the workplace as necessary to verify that the provisions of the current written program are being effectively implemented and that it continues to be effective.

4.15.2 The **Region SH&E Manager** will regularly (i.e., during annual training) consult **Employees** required to use respirators to assess their views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- Appropriate respirator selection for the hazards to which the **Employee** is exposed;
- Proper respirator use under the workplace conditions the **Employee** encounters; and
- Proper respirator maintenance.

5.0 Records

5.1 Medical Records under this section will be maintained at a minimum in accordance with *S3NA-604-PR1 Medical Records*.

5.2 Fit Test Records must be maintained in the Employee's health and safety records. *S3NA-519-FM1 Respiratory Equipment Fit Test* will be used to document each fit test.

5.3 Training Records shall be maintained in accordance with *S3NA-003-PR1 SH&E Training*.

6.0 Attachments

- 6.1 S3NA-519-WI1 Fit Testing Protocol
- 6.2 S3NA-519-WI2 User Seal Check Procedures
- 6.3 S3NA-519-WI3 Respirator Cleaning Procedures
- 6.4 S3NA-519-FM1 Respiratory Equipment Fit Test
- 6.5 S3NA-519-FM2 Respiratory Equipment Maintenance Log
- 6.6 S3NA-519-FM3 Respiratory Equipment Inspection

Fit Testing Protocol

1.0 Selection

- 1.1 The Employee shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the Employee.
- 1.2 Prior to the selection process, the Employee shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the Employee in evaluating the fit and positioning of the respirator. This instruction may not constitute the Employee's formal training on respirator use, because it is only a review.
- 1.3 The Employee shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape and if fitted and used properly will provide adequate protection.

2.0 Comfort

- 2.1 The Employee shall be instructed to hold each chosen face piece up to the face and to eliminate those that obviously do not give an acceptable fit.
- 2.2 The more acceptable face pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least 5 minutes to assess comfort.
- 2.3 If the Employee is not familiar with using a particular respirator, he/she shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
- 2.4 Assessment of comfort shall include a review of the following points with the Employee and allowing he/she adequate time to determine the comfort of the respirator:
 - Position of the mask on the nose;
 - Room for eye protection;
 - Room to talk; and
 - Position of mask on face and cheeks.

3.0 Fit Test Criteria

- 3.1 The following criteria shall be used to help determine the adequacy of the respirator fit:
 - Chin properly placed;
 - Adequate strap tension, not overly tightened;
 - Fit across nose bridge;
 - Respirator of proper size to span distance from nose to chin;
 - Tendency of respirator to slip; and
 - Self-observation in mirror to evaluate fit and respirator position.
- 3.2 The Employee shall conduct a user seal check, either the negative and positive pressure seal checks described in *S3NA-519-WI2 User Seal Check Procedures* or those recommended by the respirator manufacturer that provide equivalent protection to the procedures in *S3NA-519-WI2 User Seal Check Procedures*.

- 3.3 Before conducting the negative and positive pressure checks, the Employee shall be told to seat the mask on the face by moving the head from side to side and up and down slowly while taking in a few slow deep breaths. Another face piece shall be selected and retested if the Employee fails the user seal check tests.
- 3.4 The test shall not be conducted if there is any hair growth between the skin and the face piece sealing surface, such as stubble beard growth, beard, moustache, or sideburns that cross the respirator sealing surface. Any type of apparel that interferes with a satisfactory fit shall be altered or removed.
- 3.5 If an Employee exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the Employee can wear a respirator while performing her or his duties.
- 3.6 If the Employee finds the fit of the respirator unacceptable, the Employee shall be given the opportunity to select a different respirator and to be retested.

4.0 Exercise Regimen

- 4.1 Prior to the commencement of the fit test, the Employee shall be given a description of the fit test and their responsibilities during the test procedure. The description of the process shall include a description of the test exercises that will be performed. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.
- 4.2 The fit test shall be performed while the Employee is wearing any applicable safety equipment that may be worn during actual respirator use and that could interfere with respirator fit.

5.0 General Test Exercises

- 5.1 The following test exercises are to be performed for all fit testing methods prescribed in this procedure, except for the Controlled Negative Pressure (CNP REDON) method. A separate fit testing exercise regimen is contained in the CNP protocol. The Employee shall perform exercises, in the test environment, in the following manner:
- 5.1.1 **Normal breathing.** In a normal standing position, without talking, the Employee shall breathe normally.
- 5.1.2 **Deep breathing.** In a normal standing position, the Employee shall breathe slowly and deeply, taking caution so as not to hyperventilate.
- 5.1.3 **Turning head side to side.** Standing in place, the Employee shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the Employee can inhale at each side.
- 5.1.4 **Moving head up and down.** Standing in place, the Employee shall slowly move his/her head up and down. The Employee shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
- 5.1.5 **Talking.** The Employee shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The Employee can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.
- **Rainbow Passage.** "When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."
- 5.1.6 **Grimace.** The Employee shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT.)

- 5.1.7 **Bending over.** The Employee shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT or QLFT units that do not permit bending over at the waist.
- 5.1.8 **Normal breathing.** In a normal standing position, without talking, the Employee shall breathe normally (this is the same as the first test).
- 5.2 Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds.
- 5.3 The Employee shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.
- 5.4 The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test and the fit test must be repeated.

6.0 Qualitative Fit Test (QLFT) Protocols

6.1 General

- AECOM will ensure that persons administering QLFT are able to calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.
- AECOM will ensure that that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

6.2 Irritant Smoke (Stannic Chloride) Protocol

6.2.1 This QLFT uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

6.2.2 General Requirements and Precautions

- The respirator to be tested shall be equipped with high-efficiency particulate air (HEPA) or P100 series filter(s).
- Only stannic chloride smoke tubes shall be used for this protocol.
- No form of test enclosure or hood for the Employee shall be used.
- The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the Employee's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the Employee can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the Employee.
- The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

6.2.3 Sensitivity Screening Check

The Employee to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

- The test operator shall break both ends of a ventilation smoke tube containing stannic chloride and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute or to an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
- The test operator shall advise the Employee that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the Employee to keep his/her eyes closed while the test is performed.

- The Employee shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the Employee's direction to determine that he/she can detect it.

6.2.4 Irritant Smoke Fit Test Procedure

- The Employee being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
- The Employee shall be instructed to keep his/her eyes closed.
- The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the Employee, using the low-flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.
- If the Employee being tested has not had an involuntary response and/or has not detected the irritant smoke, proceed with the test exercises.
- The General Test Exercises shall be performed by the Employee while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of 6 inches.
- If the Employee being fit tested reports detecting the irritant smoke at any time, the test is failed. The Employee being retested must repeat the entire sensitivity check and fit test procedure.
- Each Employee passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
- If a response is produced during this second sensitivity check, then the fit test is passed.

7.0 Quantitative Fit Test (QNFT) Protocols

7.1 General

- AECOM will confirm that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and ensure that test equipment is in proper working order.
- AECOM will ensure that QNFT equipment is kept clean and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

7.2 Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol

- 7.2.1 The ambient aerosol CNC quantitative fit testing (Portacount™) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for QNFTs. A probed respirator has a special sampling device installed on the respirator to allow the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an Employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator, and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the Employee prior to the conduct of the screening test.

7.2.2 Portacount Fit Test Requirements

- Check the respirator to make sure the sampling probe and line are properly attached to the face piece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., National Institute for Occupational Safety and Health, Title 42 Code of Federal Regulations 84 series 100, series 99, or series 95 particulate filter) according to the manufacturer's instructions.
- Instruct the Employee to be tested to don the respirator for 5 minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This Employee shall already have been trained on how to wear the respirator properly.
- Check the following conditions for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; self-observation in a mirror to evaluate fit and respirator position.
- Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting face piece, try another size of the same model respirator, or another model of respirator.
- Follow the manufacturer's instructions for operating the Portacount and proceed with the test.
- The Employee shall be instructed to perform the exercises in General Test Exercises.
- After the test exercises, the Employee shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

7.2.3 Portacount Test Instrument

- The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.
- Since the pass or fail criterion of the Portacount is Employee programmable, the test operator shall confirm that the pass or fail criterion meet the requirements for minimum respirator performance.
- A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the Employee's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

User Seal Check Procedures

1.0 Requirements

- 1.1 The Employee who uses a tight-fitting respirator is to perform a user seal check to confirm that an adequate seal is achieved each time the respirator is put on.
- 1.2 Either the positive and negative pressure checks listed here or the respirator manufacturer's recommended user seal check method shall be used.
- 1.3 User seal checks are not substitutes for qualitative or quantitative fit tests.

2.0 Facepiece Positive and/or Negative Pressure Checks

2.1 Positive pressure check

- Close off the exhalation valve and exhale gently into the facepiece.
- The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal.
- For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

2.2 Negative pressure check

- Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold your breath for 10 seconds.
- The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand.
- The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove.
- If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

3.0 Manufacturer's Recommended User Seal Check Procedures

- 3.1 The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures, provided that the employer demonstrates that the manufacturer's procedures are equally effective.

Respirator Clean Procedures

1.0 Requirements

- 1.1 These procedures are general in nature. The cleaning recommendations provided by the manufacturer may be used for the respirators used by their employees, provided such procedures are as effective as those listed here.
- 1.2 Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth (i.e., confirm that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user).

2.0 Procedures for Cleaning Respirators

- 2.1 Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- 2.2 Wash components in warm (110 degree Fahrenheit [°F]; 43 degree Celsius [°C] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- 2.3 Rinse components thoroughly in clean, warm (110°F [43°C] maximum), preferably running water. Drain.
- 2.4 When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:
 - Hypochlorite solution (50 parts per million [ppm] of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 110°F (43°C); or,
 - Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45 percent alcohol) to one liter of water at 110°F (43°C); or,
 - Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- 2.5 Rinse components thoroughly in clean, warm (110°F [43°C] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- 2.6 Components should be hand dried with a clean, lint-free cloth or air dried.
- 2.7 Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
- 2.8 Test the respirator to ensure that all components work properly.
- 2.9 After the fit test, wipe down the respirator with a sanitary swab.

Americas

Respiratory Equipment Fit Test

S3NA-519-FM1

Date of Testing:		Respirator Type(s):	
Employee Name:		Location:	
Method & Testing Agent:			
Test Exercise	Pass / Fail	Test Exercise	Pass / Fail
Sensitivity Check		Normal Breathing	
Deep Breathing		Turning Head (side to side)	
Moving Head (up/down)		Rainbow Passage*	
Bending Over		Normal Breathing	
Successful Respirator Fit Determined: <input type="checkbox"/> Yes <input type="checkbox"/> No			
<p>I certify that I have been tested with the respirator(s) listed above. I have also had the opportunity to ask questions and those questions have been answered to my satisfaction. I also understand that the above fit test is voided if respirator limitations are not followed or the respirator is not worn or if conditions (e.g., facial hair) prevent a good face seal.</p>			
Employee Signature:		Date:	
Signature of Tester:		Date:	

***Rainbow Passage.** "When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."

Date:	MSA Comfo II HM	MSA Ultra Twin FM	North 7700 HM	North 7600 FM	HM	FM
Tester:	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M/L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>
Qualitative Test Agent(s): IAA <input type="checkbox"/> Smoke <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>
Quantitative Test Device	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor
Date:	MSA Comfo II HM	MSA Ultra Twin FM	North 7700 HM	North 7600 FM	HM	FM
Tester:	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M/L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>
Qualitative Test Agent(s): IAA <input type="checkbox"/> Smoke <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>
Quantitative Test Device	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor
Date:	MSA Comfo II HM	MSA Ultra Twin FM	North 7700 HM	North 7600 FM	HM	FM
Tester:	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M/L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>	S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/>
Qualitative Test Agent(s): IAA <input type="checkbox"/> Smoke <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Pass <input type="checkbox"/> Fail <input type="checkbox"/>
Quantitative Test Device	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor

- Instructions
1. Complete the Employee Information at the top of the record (one record per Employee).
 2. Enter the date of the test and the name of the person conducting the fit test.
 3. Circle the brand and model of respirator tested (e.g., MSA Comfo II, North 7700, etc.) or enter another brand and model in one of the last two columns.
 4. Circle the size of the respirator tested.
 5. For qualitative fit tests, circle the test agent used - IAA = Isoamyl Acetate, Smoke = Irritant Smoke (Stannic Chloride) and the outcome of the test (i.e., Pass or Fail).
 6. For quantitative fit tests, enter the name of the instrument used and the overall fit factor measured by the test.
 7. Keep a copy in the Employee's training files and enter subsequent (e.g., annual) tests until the record is filled.

Americas

Respiratory Equipment Inspection

S3NA-519-FM3

Date:		Inspected by:		
Air Purifier Unit #:				
		N/A	Pass	Fail
Examine Face Piece for:				
Excessive dirt		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cracks, tears, holes, or distortion from improper storage		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inflexibility (stretch and massage to restore flexibility)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cracked or badly scratched lenses in full facepieces		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incorrectly mounted full facepiece lens or broken or missing mounting clips		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lens sealed properly in receptacle, retaining clamp secured		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cracked or broken air-purifying element holder(s), badly worn threads or missing gasket(s) (if appropriate)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Examine the Head Straps or Head Harness for:				
Breaks		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loss of elasticity		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken or malfunctioning buckles and attachments		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excessively worn serrations on the head harness that might permit slippage (full facepieces only)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tears in headband at cradle attachment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Examine the Inhalation and Exhalation Valves for:				
Foreign material, such as detergent residue, dust particles, or human hair under the valve seat		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cracks, tears, or distortion in the valve material		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improper insertion of the valve body in the facepiece		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cracks, breaks, or chips in the valve body, particularly in the sealing surface		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Missing or defective valve cover		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Examine the Air Purifying Elements for:				
Incorrect cartridge, canister, or filter for the hazard		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incorrect installation, loose connection, missing or worn gaskets, or cross-threading in the holder		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expired shelf life date on cartridge or canister		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Defects Noted:				
Unit Deemed Suitable for Use		<input type="checkbox"/> Yes		<input type="checkbox"/> No

Americas

Underground Utilities and Subsurface Installation Clearance Process

S3NA-417-PR1

1.0 Purpose and Scope

- 1.1 Provides procedures designed to help prevent injuries to personnel working on the project and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with encountering underground utilities, subsurface installations, and potential overhead hazards.
- 1.2 Provides the minimum requirements to be followed for underground work (e.g., excavations, drilling, boring, and probing work) to ensure that underground installations, and subsurface structures, are identified properly before work commences.
- 1.3 This procedure applies to all Americas-based employees and operations.
- 1.4 The Project Manager is responsible for meeting all the requirements in this procedure
- 1.5 A variance provision has been included for certain requirements of this procedure found in Sections 4.3.2, 4.7.1 and 4.9. Any variance from these procedures must be approved by the **District General Manager** or the **District SH&E Manager**.
- 1.6 AECOM's clients may have specific procedures which must be followed to identify and map utility and subsurface structures on their properties or facilities. Following the client's procedures over this procedure must be approved by the **District General Manager** or the **District SH&E Manager**.

2.0 Terms and Definitions

- 2.1 **Underground Utilities** – All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signalling and communications, etc.
- 2.2 **Ground Disturbance (GD)** – Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.
- 2.3 **Intrusive Activities** – Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits/trenches or other man-made cuts, cavity, trench or depression in an earth surface formed by earth removal.
- 2.4 **Subsurface Installation** – Includes subterranean tunnels, underground parking garages and other structures beneath the surface.

3.0 References

- 3.1 S3NA-003-PR1 SH&E Training
- 3.2 S3NA-405-PR1 Drilling, Boring and Direct-Push Probing
- 3.3 American Public Works Association, Excavator's Damage Prevention Guide and One-Call System Directory International 1990-1991, Utility Location and Coordination Committee
- 3.4 [Learning Management System \(LMS\)](#)

4.0 Procedure

- 4.1 Roles and Responsibilities
 - 4.1.1 **Project Manager** – Initial and authorize work to proceed using the *S3NA-417-FM2 Underground Utility and Subsurface Installation Clearance Checklist*. Authorizes (with Site Supervisor and District SH&E Manager's concurrence) if interrupted due to unexpected effect.

- 4.1.2 **District General Manager** and **District SH&E Manager** – Authorize any variances from this procedure. Authorization to proceed with drilling if interrupted due to unexpected effect occurs.
- 4.2 Flow Chart/Checklist
- 4.2.1 *S3NA-417-FM1 Underground Utilities and Subsurface Installation Clearance Requirements* is a flow chart of the key points to know in this procedure. Prior to any intrusive subsurface work, the *S3NA-417-FM2 Underground Utility and Subsurface Installation Clearance Checklist* must be filled out and signed by the AECOM Project Manager. If the answer to any question on the checklist is “No” or “N/A”, no ground disturbance can take place without the approval of the **Project Manager**. The **Project Manager** must initial the form to authorize this approval.
- 4.3 Urban (or Non-Urban Areas without a one-call system)
- 4.3.1 Be aware that in urban areas there may be subsurface installations (e.g., underground garages) and utilities (e.g., public water, sewer, and gas pipelines) that are not covered by one-call systems. These subsurface installations and utilities require additional investigation and diligence beyond the one-call system. Additional investigation and diligence beyond the one-call system is also recommended for non-urban areas.
- 4.3.2 Private locates, as a minimum, and hand clearing, as appropriate, are also required in urban areas. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager**. Private locates and hand clearing is also recommended for non-urban areas.
- 4.3.3 The presence of subsurface installations and utilities requires special care when obstructions/refusal and voids are encountered and when unexpected absence of soil recovery occurs during drilling operations. Other indicators of subsurface installations and utilities are the presence of warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill.
- 4.4 Permits and Access Agreements
- 4.4.1 All appropriate permits (e.g., government, working near rail road, etc.) will be identified, obtained, and adhered to.
- 4.4.2 All client on-site safety procedures shall be understood and adhered to, and all client permits will be obtained.
- 4.4.3 All access agreements will be obtained and adhered to.
- 4.4.4 Be aware of the Federal/State/Provincial/Territorial regulations that govern drill rig operations and exposed moving parts.
- 4.5 General Health and Safety
- 4.5.1 Health and Safety Plan – At a minimum, a health and safety plan (HASP) that includes task hazard analyses (THAs) shall be prepared prior to any drilling, boring, and direct-push probing activities. The HASP will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions. All HASP requirements will be followed by the AECOM project team.
- 4.5.2 Training
- All staff shall be trained in identifying underground utilities and subsurface installations and the requirements. Refer to the *S3NA-003-PR1 SH&E Training and Learning Management System (LMS)*.
 - All staff shall receive client-required training.

- 4.6 Identification and Mapping of Utility and Subsurface Structures
- 4.6.1 The locations of subsurface and overhead utilities and subsurface installations will be investigated, documented, and shown on a site plan (a scaled site plan shall be used when feasible). Refer to *S3NA-406-PR1 Electrical Lines Overhead* and *S3NA-417-FM2 Underground Utilities and Subsurface Installation Clearance Checklist*.
- 4.6.2 Documentation of utility and subsurface installation clearance along with the scaled site plan will be on site at all times of intrusive activities.
- 4.6.3 Identification and mapping of Utility and Subsurface Structures is iterative with the Site Walk and should be repeated as necessary following the Site Walk as appropriate.
- 4.7 Site Walk
- 4.7.1 A site walk shall be conducted by the AECOM project team/site manager with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards. If possible, particularly at urban and industrial sites, the client/property owner or someone knowledgeable about the site and site utilities will attend the site walk. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager**.
- 4.7.2 The site walk is iterative with the Identification and mapping of Utility and Subsurface Structures and should be repeated as necessary following the Identification and Mapping of Utility and Subsurface Structures.
- 4.8 Proposed Subsurface Investigation Locations
- 4.8.1 All proposed subsurface locations will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.
- 4.8.2 Minimum set back distances from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.
- 4.9 Utility Clearance Investigation Location Confirmation
- 4.9.1 In urban areas, proposed subsurface locations will be hand cleared to 5 feet/1.5 meters (soil borings and wells) or 1 foot/0.3 meter (soil gas sampling probes) using non-mechanical methods. Hand clearance should be extended if locations of deep utilities and structures are not known. In non-urban areas, hand clearing should be conducted if possible. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager**.
- 4.10 Surface Markings
- 4.10.1 Once the underground installation has been identified, proper surface markings shall be made in accordance with the guidelines from the One-Call System (811), guidance contained in this procedure or as contract-specified.
- 4.10.2 Color-coded surface marks (paints or similar coatings) shall be used to indicate the type, location, and route of buried installations. Additionally, to increase visibility, color-coded vertical markers (temporary stakes or flags) shall supplement surface marks.
- 4.10.3 All marks and markers shall indicate the name, initials, or logo of the company that owns or operates the installation and the width of the installation if it is greater than 2 inches.
- 4.10.4 If the surface over the buried installation is to be removed, supplemental offset marking shall be used. Offset markings shall be on a uniform alignment and shall clearly indicate that the actual installation is a specific distance away.

4.11 Uniform Color Coding

4.11.1 The colors and corresponding installation type are as follows unless otherwise contract-specified.:

Red: Electric Power Lines, Cables, Conduit, and Lighting Cables

Yellow: Gas, Oil, Stream, Petroleum, or Gaseous Materials

Orange: Communication, Alarm or Signal Lines, Cables, or Conduit

Green: Sewers and Drain Lines

White: Proposed Ground Disturbance area

Pink: Temporary Survey Markings

Blue: Potable Water

Purple: Nonpotable Water

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-417-WI1 One-Call System Definition and Directory

6.2 S3NA-417-FM1 Flow Chart for Underground Utilities and Subsurface Installation Clearance

6.3 S3NA-417-FM2 Underground Utility and Subsurface Installation Clearance Checklist

6.4 S3NA-417-ST Underground Utilities-Jurisdictions/Regulations

Americas

One-Call System (811) Definition and Directory

S3NA-417-WI1

1.0 What Is It?

- 1.1 It is a Federally-mandated national “Call Before Your Dig” number, 811, to provide one telephone number for excavating contractors and the general public to call for notification of their intent to use equipment for excavating, tunneling, demolition, or any other similar work. This one-call system provides the participating members an opportunity to identify and locate their underground facilities.

As described on their web site (<http://www.call811.com>), Common Ground Alliance (CGA) was “created specifically to work with all industry stakeholders in an effort to prevent damage to underground utility infrastructure and ensure public safety and environmental protection.” CGA also services as an organization to continuously update best practices among the growing underground industry. The CGA web site provides current one-call information for all states and provinces.

2.0 Why Is It Needed?

- 2.1 Damage to underground facilities increased considerably following the building boom of the 1950s, 1960s, and early 1970s when the trend was to go underground with utilities. Thousands of miles of underground facilities are vulnerable to excavating machines such as backhoes, and the resulting damage can interrupt utility service and threaten life, health, and property.

3.0 How to Get It

- 3.1 811 is the designated call before you dig phone number that directly connects you to your local one call center. Each state has different rules and regulations governing digging, some stricter than others. The CGA web site provides current contact information to find state-specific information as well as links to submit an online digging request where available

4.0 Disclaimer

- 4.1 The purpose of this directory is to illustrate the extent of one-call service available. Users must verify information is current including the extent and limit of service from local sources.

Province/State	One-Call Agency	Number
Canada	www.clickbeforeyoudig.com	
Alberta	Alberta One Call www.albertaonecall.com	1.800.242.3447
British Columbia	BC One Call www.bconecall.bc.ca	1.800.474.6886
Manitoba	Click Before You Dig www.clickbeforeyoudigmb.com	Various – see website
Ontario	Ontario One Call www.on1call.com	1.800.400.2255
Québec	Onfo Excavation www.info-ex.com	1.800.663.9228
Saskatchewan	Sask 1 st Call www.sask1stcall.com	1.866.828.4888
United States	www.call811.com	811
Alabama	Alabama 811	1.800.292.8525
Alaska	Alaska Digline, Inc.	1.800.478.3121
Arizona	Arizona 811	1.800.782.5348

Province/State	One-Call Agency	Number
Arkansas	Arkansas One Call	1.800.482.8998
California	(North & Central) USA North 811	1.800.227.2600
	(South) Dig Alert	1.800.227.2600
Colorado	Colorado 811	1.800.922.1987
Connecticut	Call Before You Dig	1.800.922.4455
Delaware	Miss Utility of Delmarva	1.800.282.8555
District of Columbia	District One Call	1.202.265.7177
Florida	Sunshine 811	1.800.432.4770
Georgia	Georgia 811	1.800.282.7411
Hawaii	Hawaii One Call	1.866.423.7287
Idaho	Dig Line, Inc.	1.800.342.1585
	(Bonner/Boundry) Pass Word	1.800.626.4950
	(Kootenai County) Pass Word	1.800.428.4950
	(Shoshone-Benewah) Pass Word	1.800.398.3285
Illinois	(Chicago) Digger -Chicago Utility Alert Network	312.744.7000
	(Outside of Chicago) JULIE	1.800.892.0123
Indiana	Indiana 811	1.800.382.5544
Iowa	Iowa One Call	1.800.292.8989
Kansas	Kansas 811	1.800.344.7233
Kentucky	Kentucky 811	1.800.752.6007
Louisiana	LA One Call	1.800.272.3020
Maine	Dig Safe	1.888.344.7233
Maryland	(West of Chesapeake Bay) Miss Utility of Maryland	1.800.257.7777
	(East of Chesapeake Bay) Miss Utility of Delmarva	1.800.282.8555
Massachusetts	Dig Safe System, Inc.	1.888.344.7233
Michigan	Miss Dig	1.800.482.7171
Minnesota	Gopher State One Call	1.800.252.1166
Mississippi	Mississippi 811	1.800.227.6477
Missouri	Missouri One Call System	1.800.344.7483

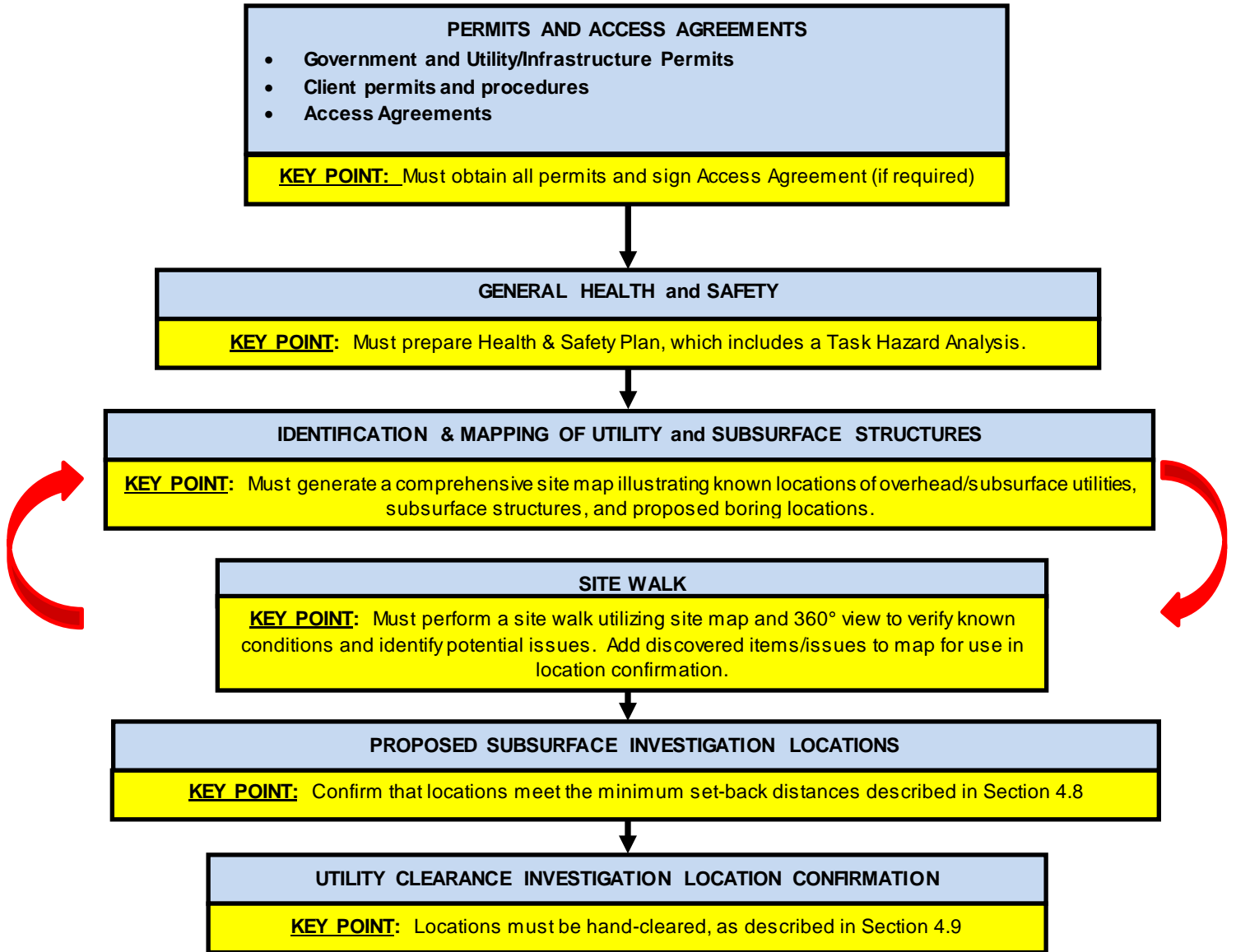
Province/State	One-Call Agency	Number
Montana	Montana 811	1.800.424.5555
	(Flathead and Lincoln Counties) Montana One Call Center	1.800.551.8344
Nebraska	Nebraska 811	1.800.331.5666
Nevada	USA North 811	1.800.227.2600
New Hampshire	Dig Safe System, Inc.	1.888.344.7233
New Jersey	New Jersey One Call	1.800.272.1000
New Mexico	New Mexico 811	1.800.321.2537
New York	(North of 5 Boroughs) Dig Safely New York	1.800.962.7962
	(5 Boroughs and Long Island) New York 811, Inc.	1.800.272.4480
North Carolina	North Carolina 811	1.800.632.4949
North Dakota	North Dakota One Call	1.800.795.0555
Ohio	Ohio Utilities Protection Service	1.800.362.2764
Oklahoma	Call Okie	1.800.522.6543
Oregon	Oregon Utilities Notification Center	1.800.332.2344
Pennsylvania	Pennsylvania One Call System, Inc.	1.800.242.1776
Puerto Rico	Puerto Rico Public Service Commission 811	
Rhode Island	Dig Safe System, Inc.	1.888.344.7233
South Carolina	South Carolina 811	1.888.721.7877
South Dakota	South Dakota One Call	1.800.781.7474
Tennessee	Tennessee 811	1.800.351.1111
Texas	Texas 811	1.800.545.6005
	Lone Star 811	1.800.669.8344
Utah	Blue Stakes of Utah	1.800.662.4111
Vermont	Dig Safe System, Inc.	1.888.344.7233
Virginia	Virginia 811	1.800.552.7001
Washington	Utility Notification Center	1.800.424.5555
West Virginia	WV 811	1.800.245.4848
Wisconsin	Diggers Hotline	1.800.242.8511
Wyoming	One-Call Of Wyoming	1.800.849.2476

Americas

Key Points to Know Flow Chart for Underground Utilities and Subsurface Installation Clearance

S3NA-417-FM1

Before Any Underground Utilities and Subsurface Installation Clearance



Americas

Underground Utility and Subsurface Installation Clearance Checklist

S3NA-417-FM2

Location:		Project #:	
Contractor:		Client:	
Date:	Time:	Weather:	
Inspector:		Project Manager:	

Notes:

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.
Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

	Yes	No	N/A
I. Permits and Access Agreements			
1. Have all appropriate permits been identified and obtained (e.g., drilling, encroachment, working near railroads, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Have all client requirements, including client permits been identified and obtained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. If working off-site is(are) site access agreement(s) executed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
II. General Health and Safety			
1. Has a Health and Safety Plan been prepared for AECOM employees?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Do on-site personnel have required-level PPE?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Do on-site personnel have required-level of training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
III. Identification and Mapping of Utility and Subsurface Structures			
1. Is a Site Plan showing the proposed subsurface locations and utility locations attached to this check list?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Have utilities and subsurface installations been investigated as being present, including the following:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Steam, gas and electric?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Sewer and water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Subterranean tunnels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Fiber optics (Note routine utility geophysical survey will not identify fiber optic cables)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Traffic control cables?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Others (identify)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Have all Federal/State/Provincial/Territorial and other "One Call" providers marked their facilities or otherwise notified they do not have any facilities near the proposed subsurface/intrusive locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Has the Federal/State/Provincial/Territorial or other "One Call" provider identified what utilities and underground structures are <u>not</u> included in their provider system (e.g., non-utility underground structures)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.

Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

	Yes	No	N/A
5. Has a utility locating contractor performed geophysical and/or other surveys of the proposed subsurface/intrusive locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were all circuits on during subsurface checks if the checks were for identifying energized lines (e.g., circuits on timers or light sensing switches)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Are overhead utilities or obstructions present that may prevent the safe operation of drilling/excavation equipment and, if present, has the AECOM Overhead Electrical Line Acknowledgement Form been signed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Was there visual verification that each of the proposed locations does not lie on a line connecting two similar manhole covers (e.g., sanitary sewer or storm drain)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was there visual verification that the ground in the vicinity of each of the proposed subsurface locations has not subsided, been excavated and patched, give the appearance it may be covering a former trench (e.g., linear cracks, sagging curbs, linear re-pavements) and do not lie on a line with any water, gas, electrical meters, utility cleanouts, or other utility boxes in the surrounding areas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IV. Site Walk

1. Has a site walk been performed that includes the following:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Reviewing all planned intrusive locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Adjusting locations away from subsurface utilities and installations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Determining the appropriate utility clearance activities for each location?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Determining the presence and location of overhead utilities and obstructions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Walk around perimeter of the site to observe physical hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Walk around 50 feet (15 meters) from perimeter of the site to observe physical hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Walk around 50 feet (15 meters) radius from each proposed subsurface intrusion location?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

V. Proposed Subsurface Investigation Locations*

1. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are all of the proposed subsurface locations at least 7 feet (2.1 meters) from the pad surrounding any underground storage tanks (USTs) shown on the Site Plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utilities shown on the Public Right-of-Way street improvements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Are all proposed subsurface locations requiring a drill rig for installation at least 10 feet (3 meters) from any energized overhead power line (or further based on line voltage)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utilities identified during any geophysical survey performed using ground-penetrating radar (GPR) in conjunction with other technology?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.

Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

	Yes	No	N/A
VI. Utility Clearance Investigation Location Confirmation*			
1. Have subsurface locations been hand cleared as follows? Hand clearance should be extended if locations of deep utilities and structures are not known. In non-urban areas hand clearing should be conducted if possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. For soil borings/monitoring wells excavate to a minimum of 5 feet (1.5 meters) below ground surface using non-mechanical methods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. For soil gas sampling excavated to 1 foot (0.3 meter) below grade or below the bottom of a concrete floor prior to the installation of soil gas sample probe points?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* Exceptions to requirements of the utility clearance process include the following: sites where extensive utility mapping has been completed and/or where extensive activities have already been performed; locations where facility layout is well documented and understood; and sites or portions of large sites where utilities are known not to exist currently or to not have ever existed throughout the life of the facility, property or site.			

Underground Utilities – Jurisdictions/Regulations

1.0 Regulations

1.1 Every province and territory has strict regulations governing the procedures and practices that MUST be followed. As these regulations vary slightly, before work can commence, the Project Manager MUST review these documents and identify how all of the hazards will be addressed and how the regulations will be adhered to:

- 1.1.1 Occupational Health and Safety Code
- 1.1.2 Regional or industry-specific regulations (e.g., Alberta EUB [Pipeline Act]).

2.0 Occupational Health and Safety Regulations

2.1 The following Occupational Health and Safety regulations apply directly to ground disturbance:

Jurisdiction	Regulation
United States	
OSHA	CFR 1926.651
Canada	
Alberta	OHS Code (2009) Sect 441 – 464, Schedule 9
British Columbia	OHS Regulation (1997) Sect 20.78 – 20.101
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 26.0 – 26.47
New Brunswick	OHS Regulation (91-191) Sect 93 – 94.1, 180 – 188
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 139 – 148
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 153, 166 – 173
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 396 – 432
Ontario	O. Reg. 213/91 Sect 6, 7, 222 – 242
Prince Edward Island	OHS Regulations (EC180/87) Sect 12.1 – 12.15
Quebec	Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 3.15.1 – 3.15.10
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 257 – 265, Schedule Table 17
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 10.62 – 10.72

Appendix 1A

New York State Department of Health Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix I
Quality Assurance
Project Plan (QAPP)



Environment

Prepared for:
Superfund Standby Program
NYSDEC
Albany, NY

Prepared by:
AECOM
Latham, NY
October 2015

QUALITY ASSURANCE PROJECT PLAN (QAPP)

Korkay Incorporated
Broadalbin, New York 12025
Work Assignment D007626.20

Prepared for:

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QUALITY ASSURANCE PROJECT PLAN (QAPP)

Korkay Incorporated
Broadalbin, New York 12025
Work Assignment D007626.20



Prepared By: Greta White



Reviewed By: Robert Montione

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1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

The purpose of this Quality Assurance Project Plan (QAPP) is to document planned monitoring activities and establish the criteria for performing these activities at a predetermined quality for the work conducted completed by AECOM Technical Services Northeast, Inc. (AECOM) under NYSDEC Standby Engineering Contract D007626.

Project work will be conducted in general accordance with the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010a), technical requirements in Contract D007626 between NYSDEC and AECOM (NYSDEC and AECOM, 2010), and United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

The QAPP is intended to be a companion document to the Site Management Plan (SMP). A QAPP Addendum has been prepared as an Appendix included in the site-specific SMP for each Work Assignment to address site-specific conditions and project-specific requirements.

1.2 PROJECT MANAGEMENT AND ORGANIZATION

1.2.1 Personnel

The general responsibilities of key project personnel are listed below.

Program Manager – Mr. Scott A. Underhill, PE will have responsibility for overall program management and coordination of subcontractors to complete the work.

Project Manager – Mr. Walter Howard will have responsibility for overall project management and coordination with NYSDEC, and will coordinate the initiation and implementation of the Task 2 activities.

Task Leaders/Field Team Leaders – These individuals and roles, determined on a work assignment-specific basis, will share the responsibility of implementing and coordinating the field and office project activities.

QA Officer – Mr. Robert Montione (AECOM) will serve as the Program Quality Assurance Officer (QAO) for work assignments issued under this contract. The QAO will be responsible for oversight of the data validation and laboratory subcontractors, as well as data usability reports. The QAO will work with the AECOM database manager to assure that electronic deliverables provided by the laboratory are accurate and are formatted consistent with AECOM and NYSDEC requirements. The Program QAO may designate another qualified individual to serve as project QA officer to oversee the data-to-day quality assurance aspects of specific work assignments.

H & S Officer – Mr. Phil Jones (AECOM) will be responsible for oversight of the preparation of the project health and safety plan, approving it, and tracking of its implementation.

Database Manager – Ms. Angela Toma-Eisele (AECOM) will serve as database manager. The database manager is responsible for verifying that laboratory deliverables meet AECOM and NYSDEC electronic deliverable specifications, and for preparing the final EQUIS deliverable for submission to NYSDEC.

Resumes for most of the AECOM personnel have previously been submitted to the Contract Development Section. An updated personnel list is being submitted under separate cover.

1.2.2 Specific Tasks and Services

AECOM will obtain standby subcontractor specialists for services relating to laboratory/analytical services and data validation services. Field surveying and mapping will be provided by either through a pre-approved professional services contract (contracts not yet awarded) or by a site-specific solicitation. Geophysical/utility locating and drilling and monitoring well installation are acquired on a work-assignment-specific basis. Specific subcontractors for individual work assignments will be identified in the work plan.

Laboratory Analysis –Analysis of groundwater samples will be performed by TestAmerica Laboratories, Inc., an Environmental Laboratory Approval Program (ELAP) certified laboratory out of Amherst, New York. TestAmerica will be procured for the work through its Callout Contract with NYSDEC.

Surveying – Land surveying services will be performed by M.J. Engineering and Land Surveying, P.C. The scope of surveying work will include surveying the location and elevation of all monitoring wells and developing a updated base map of the Korkay Site and surrounding investigation area.

1.3 SITE DESCRIPTION AND LOCATION

Background data on the site, including the site description and location, site history, previous investigations, and current conditions, are summarized in the SMP.

2.0 SITE INVESTIGATION

Site investigation procedures will be developed on a work assignment-specific basis.

2.1 Field Sampling Procedures

Field activities will be detailed in the Work Plan or FAP and are not repeated in the QAPP.

2.2 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 Work Plan or FAP; the procedures discussed here are general and may be superseded by project-specific requirements (as documented in the work plan or FAP). Field equipment rinsate blanks (see Section 3.6.1) are generated and analyzed to monitor the effectiveness of field decontamination procedures.

Cross contamination is minimized by the use of vendor-decontaminated, dedicated, disposable equipment to the extent practical.

2.2.1 Decontamination Procedures

For larger projects, and as indicated in the Work Plan or 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. The pad will also be used for small equipment decontamination as well as personnel decontamination.

2.2.2 Equipment Decontamination

Equipment decontamination for non-disposable equipment such as Geoprobe Hydropunch samplers, transducer probes and cables, etc., 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 large clean plastic garbage can filled with potable water and then run for several minutes (to decontaminate both exterior and interior parts); 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 used. 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;
- Distilled/deionized rinse, air dry.

2.2.3 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the work plan, FAP, or Health and Safety Plan (HASP). This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

3.0 SAMPLE HANDLING

3.1 SAMPLE IDENTIFICATION AND LABELING

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. Sample identification may be limited to a specific number of alphanumeric characters to be consistent with the limitations of the laboratory tracking/reporting software. It should be noted that the field sample IDs shown below are not those required for the EQuIS deliverable; AECOM will coordinate with the analytical laboratory so that the sample types and codes are entered properly for each field and QC sample, and that the codes are consistent with the most recent NYSDEC Valid Values.

AS = Air Sparge Well

MW = Monitoring Well

VEW = Vapor Extraction Well

FB = Field (Equipment Rinsate) Blank

TB = Trip Blank

XX = Numerical sample identifier (up to five characters). This will ordinarily be the number of the monitoring well or soil boring location from which the sample was obtained.

As part of the unique identifier, the sample date will be included following any location that may have more than one sample collected. The format will be MMDDYY. For example MW-01S that is sampled on May 24, 2011 will be MW-01S_052411.

QC field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using the same system as the original by adding 50 to the original well ID (e.g., MW-51S_052411 would be a field duplicate of MW-01S_052411). The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager. As the field duplicates are blind to the laboratory, the NYSDEC Valid Value for a field duplicate (FD) along with the identification of the parent sample will be done by AECOM after the EQuIS deliverable is received from the laboratory.

Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink:

- Site name, location, and job number;
- Sample name;
- Date and time;

- Sampler's name;
- Preservative;
- Type of sample (e.g., water); and
- Requested analyses.

3.2 SAMPLE BOTTLES, PRESERVATION, AND HOLDING TIME

Table 1 identifies the sample preparation and analytical method, matrix, holding time, containers, and preservatives for the typical analyses to be performed under this contract. Sample bottle requirements, preservation, and holding times are discussed further below.

3.2.1 Sample Containers

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements and any regulatory protocol requirements.

Sample bottles will be provided by the analytical laboratory and will conform to the requirements of the USEPA Specifications and Guidance for Contaminant-Free Sample Containers. Aqueous samples for volatile organic compound (VOC) analysis will be collected in 40-mL vials with teflon septa.

3.2.2 Sample Preservation

Samples will be preserved as indicated below and summarized on Table 1.

Aqueous Samples:

Volatile organics - cooled to 4^o C; HCl added to pH ≤ 2.

Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory. The pH of samples will be spot-checked in the field and additional preservative will be added as needed. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the AECOM Quality Assurance Officer (QAO). If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation and addition will be modified or additional preservative will be added in the field by the sampling team.

3.2.3 Holding Times

Contractual holding times (see Table 1) are calculated from the validated time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection. Holding time requirements will be those specified in the NYSDEC ASP 2005.

Although trip blanks are prepared in the analytical laboratory and shipped to the site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

3.3 CHAIN OF CUSTODY AND SHIPPING

A chain-of-custody form will trace the path of sample containers from the project site to the laboratory. Chain-of-custody forms are typically provided by the analytical laboratory.

Sample bottle tracking sheets or the chain-of-custody will be used to track the containers from the laboratory to the containers' destination. The project manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. Sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4° C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be shipped by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form.

3.4 LABORATORY SAMPLE RECEIPT

Upon receipt at the laboratory, a laboratory representative inspects the samples for integrity and checks the shipment against the chain-of-custody/analytical task order form. Discrepancies are addressed at this point and documented on the chain-of-custody form and the cooler checklist (an example will be provided in each of the project-specific Field Sampling and Analysis Plans). Discrepancies are reported to the Laboratory Project Manager who contacts the AECOM Project Manager or QAO for resolution.

When the shipment and the chain-of-custody are in agreement, the custodian enters the samples into the Laboratory Information Management System and assigns each sample a unique laboratory number. This number is affixed to each sample bottle. The custodian then enters the sample and analysis information into the laboratory computer system.

3.4.1 Laboratory Sample Custody

The laboratory must satisfy the sample chain-of-custody requirements by implementing the following procedures for laboratory/sample security:

- Samples are stored in a secure area;
- Access to the laboratory is through a monitored area;
- Visitors sign a visitor's log and are escorted while in the laboratory;

- Only the designated sample custodians have keys to sample storage area(s); and
- Transfers of samples in and out of storage are documented.

3.4.2 Sample Storage, Security, and Disposal

While in the laboratory, the samples and aliquots that require storage at $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ are maintained in a locked refrigerator unless they are being used for analysis. The laboratory is responsible for sample storage and security so that:

- Samples and extracts are stored for 60 days after the final analytical data report has been submitted to AECOM. The samples, extracts, and digestates are then disposed by the laboratory in accordance with laboratory SOPs and applicable regulations; and
- Samples are not stored with standards or sample extracts.

4.0 DATA QUALITY REQUIREMENTS

4.1 ANALYTICAL METHODS

Water sample analyses for these contracts will typically utilize USEPA SW-846 methods as listed below; however, specific methods will be determined on a work assignment-specific basis. Analytical and extraction/sample preparation methods typically used are shown on Table 1 and summarized below.

Volatile Organics - SW-846 Method 8260B

Semivolatile Organics – SW-846 Method 8270C

Pesticides – SW-846 Method 8081

Analytical methods used for project under these contracts are presented in the NYSDEC Analytical Services Protocol (ASP), 2005. It is the laboratory's responsibility to be familiar with this document and procedures and deliverables within it pertaining to New York State work. Full Category B deliverables will be required unless specified otherwise in specific work assignments or work plans.

NYSDEC has procured TestAmerica Laboratories, Inc., a NYSDOH ELAP certified analytical laboratory, confirmed to be in good standing for the applicable parameter groups, to perform groundwater analysis on all samples collected.

4.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPP will be used in assessing the uncertainty associated with decisions related to this site.

4.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is based on the DQOs established for the project. The method detection limit is determined in accordance with the procedure in ASP Exhibit A, section 4.9.2.12, which is consistent with the procedure in 40 CFR Part 136 Appendix B.

The RL for nondetected analytes will be the lowest calibration standard associated with the analysis. Reporting limits will be equal to or lower than those presented in Exhibit C of ASP 2005 for the applicable method. Analytes detected at concentrations below the RL but above the MDL will be flagged "J" (estimated) by the laboratory. Typical RLs are summarized on Table 2.

The reporting limits and MDLs of the assigned laboratory will be reviewed by AECOM's QAO for each project to verify that the laboratory sensitivity is sufficient to meet the project objectives. These will typically include meeting the applicable groundwater standards, criteria, and guidance (SCGs) values as compiled in TOGS 1.1.1.

4.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Matrix spike duplicate analyses will be performed once for every 20 samples for VOCs.

Relative Percent Difference (RPD) criteria determined from laboratory performance data are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every 20 samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples, and matrix spikes and matrix spike duplicates for organic analyses; it will be expressed as the relative percent difference (RPD):

$$RPD = 100 \times 2(|X_1 - X_2|) / (X_1 + X_2)$$

where:

X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is $\leq 50\%$ RPD for analytes detected at concentrations at least 2 times the reporting limit. Where one or both analytes are detected at less than 2 times the RL, the criterion is the absolute difference "D" ($X_1 - X_2$), and D should be less than the RL for the analyte.

4.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent method recovery criteria and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike or laboratory control will be performed once for every analytical batch or as specified in the method or ASP. Other method-specific laboratory QC samples (such as continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\% \text{ Recovery} = 100 \times (\text{SSR}-\text{SR})/\text{SA}$$

Where:

SSR = Spiked sample Result

SR = Sample Result, and

SA = Spike Added

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples. Accuracy values can be presented in a variety of ways. For projects under this NYSDEC contract, accuracy will be normally presented as percent recovery.

Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$$\% \text{ Recovery} = (\text{R}/\text{S}) \times 100$$

Where:

S = surrogate spike concentration

R = reported surrogate compound concentration

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

4.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

4.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the US Environmental Protection Agency (USEPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;

- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and,
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

Comparability within any specific project is also assessed by comparison of the project data to data generated previously; and, if available, comparison of the data for multiple sampling events conducted for the project. Comparability (consistency) of sampling techniques is also assessed, to some extent, by analysis of field duplicates; although it should be noted that large differences between field duplicates may result from a wide variety of causes, not just inconsistent sampling.

4.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data for all planned samples. Completeness of 100 percent indicates that all planned samples were collected; and the resultant data were fully valid and acceptable. As completeness is a function of both field activities and laboratory activities, separate completeness goals are established for each.

The default goal for sampling completeness is 95 percent, as is calculated as

$$\text{Sampling Completeness (\%)} = (\text{Sc}/\text{Sp}) \times 100$$

Where:

Sc = Samples collected (submitted) for analysis (documented from field records or COC)

Sp = Samples planned (as documented in the FAP or QAPP)

The default goal for analytical completeness is also set at 95 percent. Analytical completeness may be less than 100 percent either due to systemic failures that result in the rejection or loss of data for an entire sample; or compound-specific rejection (e.g., 2-hexanone) within an otherwise valid analysis.

For typical work assignments, the default overall completeness goal is 90 percent useable data. The impact of rejected or unusable data will be made on a case-by-case basis. If the goals of the project can be achieved without the missing datum or data, or if data from a different sampling event can be used to fill the data gap, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

4.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be “demonstrated analyte-free.” The criteria for analyte-free water are based on the USEPA-assigned values for the Contract Required Quantitation Limits (CRQLs) for CLP analyses, or the RL for SW-846 or other methods.

However, specifically for the common laboratory contaminants (acetone and 2-butanone), the allowable limits are five times the CRQL (or RL). For methylene chloride, the limit is 2.5 times the

CRQL. For common SVOC contaminants (phthalate esters such as bis(2-ethylhexyl) phthalate), the limit is 5 times the CRQL.

The analytical testing required for the water to be demonstrated as analyte-free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

Table 2 of this QAPP shows typical QA/QC samples and reporting limits. QA/QC samples are discussed below.

4.3.1 Field Equipment (Rinsate) Blanks

Equipment blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

Rinsate blanks are not required when samples are collected directly into laboratory-provided sample containers.

Typically, one rinsate blank will be collected for every 20 field samples collected or one per week, whichever is more frequent, for each type of non-dedicated and/or non-disposable sampling equipment.

4.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method.

Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day.

The default field duplicate precision (RPD) objective is $\leq 50\%$ percent RPD for all matrices where the sample concentration is at least two times the reporting limit. Where the analyte is detected in both samples but the concentration is less than 2 times the reporting limit, precision is assessed by the absolute difference, which should be less than the reporting limit. The RPD is not calculable when the analyte is not detected in one or both analyses. A more detailed discussion of the calculation is provided in Section 4.2.2 (Precision), above. Field duplicates will be collected at a frequency of one per 20 environmental samples for aqueous analyses.

4.3.3 Split Samples

Split samples are used for performance audits or inter-laboratory comparability of data. Split samples may also be generated if a site owner or PRP requests them. A split sample will be defined as at least two separate sub-samples taken from a single original sample which has been thoroughly mixed or homogenized prior to the formation of the split samples. The exception to this is samples for volatile organics analysis which will not be homogenized. Collection of split samples may be conducted only when specifically requested by NYSDEC.

4.3.4 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for VOC analysis.

Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

4.3.5 Temperature Blanks

The laboratory will use either an infrared instrument to measure the temperature of liquid samples, or a temperature blank will be used to measure the temperature of liquid samples. If used, temperature blanks will be supplied by the analytical laboratory. If multiple coolers are necessary to store and transport aqueous samples, then each cooler will contain an individual temperature blank (if used).

4.4 FIELD TESTING QC

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory samples. Field QC checks of control limits for pH, specific conductance (conductivity) and turbidity are detailed below. The calibration frequencies discussed below are the minimum. Field personnel can and should check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings. Calibration logs for the instruments discussed below will be provided in the work plan or FAP.

4.4.1 pH Meter

The pH meter is calibrated daily, using two standards bracketing the range of interest (generally 4.0 and 7.0). If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by more than 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used.

Note that gel-type probes take longer to equilibrate (up to 15 minutes at near-freezing temperatures); this must be taken into account in calibrating the instrument and reading samples and standards.

4.4.2 Specific Conductivity

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter daily. Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride (KCl) solutions in accordance with manufacturer's recommendations.

4.4.3 Turbidity

The turbidity meter should be calibrated using a standard as close as possible to 50 NTU (the critical value for determining effectiveness of well development and evacuation). The turbidimeter will be checked daily. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar).

4.4.4 Temperature

Temperature probes associated with instruments (such as the YSI SCT-33 conductivity and temperature meter) are not subject to field calibration, but the calibration should be checked to monitor instrument performance. It is recommended that the instrument temperature reading be checked against a NIST-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained.

4.5 LABORATORY QUALITY ASSURANCE

4.5.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every twenty samples analyzed or as otherwise specified in the analytical protocol.

4.5.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (with the exception of volatile organics), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a matrix spike and a matrix spike duplicate (MS/MSD) for volatile organics.

4.5.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: matrix spikes and matrix spike duplicates (MS/MSD), which are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD samples will be analyzed at a frequency of one (pair) for every 20 samples. In addition, matrix spike blanks (MSBs) will also be prepared and analyzed by the laboratory as required by NYSDEC ASP.

4.5.4 Laboratory Control Sample

A fortified clean matrix (laboratory control sample, or LCS) is analyzed with each analysis. In some cases a "Laboratory-Fortified Blank" (LFB) may serve as the LCS. These samples generally consist of a standard aqueous or solid matrix fortified with the analytes of interest for single-analyte methods and selected analytes for multi-analyte methods according to the appropriate analytical method. The LCS may be analyzed in duplicate for some methods (LCSD). The analyte recovery from each analysis (LCS and LCSD) is used to monitor analytical accuracy; analytical precision can be assessed from evaluation of the LCS/LCSD in the same manner as the MS/MSD.

5.0 FIELD DATA DOCUMENTATION

Field reporting documentation, including field logbooks and field data reporting forms, is discussed in FAP Section 3, especially sections 3.1 and 3.2, and not repeated here.

6.0 EQUIPMENT CALIBRATION AND MAINTENANCE

Quality assurance for instrumentation and equipment used for a project is controlled by a formal calibration program, which verifies that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. Instruments and equipment that measure a quantity, or whose performance is expected at a stated level, are subject to calibration. Calibration is performed using reference standards or externally by calibration agencies or equipment manufacturers.

6.1 STANDARD WATER AND AIR QUALITY FIELD EQUIPMENT

Field equipment used during the collection of environmental samples typically includes a turbidimeter (turbidity per EPA Method 180.1), pH meter (pH per EPA Method 150.1), conductivity meter (specific conductance per EPA Method 120.1), thermometer, and photoionization detector. See also Section 4.4 of this QAPP for additional discussion.

6.2 LABORATORY EQUIPMENT CALIBRATION

Laboratory equipment will be calibrated according to the method-specific requirements of the 2005 NYSDEC ASP, Exhibit E, Parts II and III, and maintained following professional judgment and the manufacturer's specifications, and additional requirements as specified in the ELAP certification manual.

6.2.1 Calibration Procedure

Written procedures are used for all instruments and equipment subject to calibration. For chemical analyses typically performed for these contracts, the calibration procedures are specified in the methods as compiled in the ASP. If established procedures are not available, a procedure is developed considering the type of equipment, stability characteristics of the equipment, required accuracy, and the effect of operational error on the quantities measured.

6.2.2 Calibration Frequency

Calibration frequency is based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended data use, specified analytical methods, effect of error upon the measurement process, and prior experience.

6.2.3 Calibration Reference Standards

Two types of reference standards will be used by the standby laboratories for calibration:

Physical standards, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators and ovens, are generally used for periodic calibration.

Chemical standards, such as Standard Reference Materials (SRMs) provided by the National Institute of Standards and Technology (NIST) or USEPA, may also include vendor-certified materials traceable to NIST or USEPA SRMs. These are primarily used for operational calibration.

6.2.4 Calibration Failure

Equipment that cannot be calibrated or becomes inoperable is removed from service. Such equipment must be repaired and satisfactorily recalibrated before re-use. For laboratory equipment that fails calibration, analysis cannot proceed until appropriate corrective action is taken and the analyst achieves an acceptable calibration.

Laboratory managers are responsible for development and implementation of a contingency plan for major equipment failure. The plan includes guidelines on waiting for repairs, use of other instrumentation, subcontracting analyses, and evaluating scheduled priorities.

6.2.5 Calibration Records

Records are prepared and maintained for each piece of equipment subject to calibration. Records demonstrating accuracy of preparation, stability, and proof of continuity of reference standards are also maintained. Copies of the raw calibration data are kept with the analytical sample data.

6.3 OPERATIONAL CALIBRATION

Operational calibration is generally performed as part of the analytical procedure and refers to those operations in which instrument response (in its broadest interpretation) is related to analyte concentration. Included are the preparation of a standard response (calibration) curve and often the analysis of blanks.

Preparation of a standard calibration curve is accomplished by the analysis of calibration standards, which are prepared by adding the analyte(s) of interest to the solvent that is introduced into the instrument. The concentrations of the calibration standards are chosen to cover the working range of the instrument or method. For most methods, five calibration standards are used, with the concentration of the lowest calibration standard being the reporting or quantitation limit for that analysis. Sample measurements are made and reported within this working range; apparent concentrations which exceed the high end of the calibrated range ("E"-flagged data for organic analyses) are diluted (or a smaller sample is used) and re-analyzed. The calibration curve is prepared by plotting or performing a linear regression of the instrument responses against the analyte concentration.

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

7.1 LABORATORY DATA REPORTING AND REDUCTION

Data reduction is the process by which raw analytical data generated from laboratory instrument systems is converted into usable concentrations. The raw data, which may take the form of area counts, instrument responses, or observations, are processed by the laboratory and converted into concentrations expressed in the parts per million (mg/kg or mg/L) or parts per billion ($\mu\text{g}/\text{kg}$ or $\mu\text{g}/\text{L}$) range. Raw data from these systems include compound identifications, concentrations, retention times, and data system print-outs. Raw data are usually reported in graphic form, bar graph form, or tabular form. The laboratory will follow standard operating procedures consistent with the data handling requirements of the applicable methods.

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 2005 revision of the NYSDEC ASP. ASP Deliverables are either Category B (full deliverables; similar to USEPA CLP requirements) or Category A (a reduced deliverable level). For this contract, Category B deliverables are the default and will be provided for all deliverables generated under the contract unless explicitly indicated otherwise on a site-specific basis. Laboratory data reports will conform to NYSDEC Category B deliverable requirements, as specified in Exhibit B, Part II.E, Sections 2 and 3, respectively.

Copies of the laboratory's generic Quality Assurance Management Plan (QAMP, as defined in ASP 2005 Exhibit E, Part I) will be maintained at AECOM's principal contact office (Latham, NY for D007626). The laboratory's QAMP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

To meet NYSDEC electronic data deliverable (EDD) requirements, standby laboratories subcontracted by AECOM for this work will be required to submit electronic deliverables in an EQUIS 4-file format consistent with AECOM standards. AECOM's database manager will be responsible verifying that the file submitted meets these specifications including verifying that current NYSDEC Valid Values were used for sample coding; providing an Excel (or Access) file to the data validator; uploading the validated data into the database; overseeing the uploading of any other data (field data, boring log information, etc.), and submitting a final EQUIS deliverable to NYSDEC that meets NYSDEC EDD requirements.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form (submitted electronically or on computer diskette). The data spreadsheet will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

7.2 DATA USABILITY

Subsequent to review of the items evaluated in the subcontractor data validator reports (DUSRs) and accompanying tables, AECOM's QA staff then prepares a brief data usability summary. The data usability summary, which will be provided as part of the project report, encompasses both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the QA officer's translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets.

The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement.

Data which has not been validated and field data used for the project will be discussed in the data usability summary, including any limitations on the use of such data.

7.3 FIELD DATA VERIFICATION

Field personnel will record all field data in bound field logbooks and on standard forms. After checking the validity of the data in the field notes, the Project Manager or his/her designee will reduce the data to tabular form, when possible, by entering the data into data files. Where appropriate, the data files will be set up for direct input into the project database. Subjective data will be filed as hard copies for later review by the Project Manager and incorporation into technical reports, as appropriate.

Verification of field data will be performed at two different levels. The first level of data verification will be performed at the time of collection by following standard procedures and QC checks. The second level of review consists of the Project Manager, Task Manager, or other competent personnel, reviewing the data to confirm that the correct codes and units have been included. After data reduction into tables and arrays is complete, the Site Manager will review data sets for anomalous values. The Project Manager, who will review field reports for reasonableness and completeness, will validate subjective field and technical data.

8.0 PERFORMANCE AND SYSTEM AUDITS

Audits are systematic checks to determine the quality of operation of some activity or function in the field or laboratory. Field audits are conducted to verify adherence to proper field and sampling procedures. Audits are of two types, as described below:

- Performance audits are independent safety and health, procedure, and/or sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process; and
- System audits are onsite qualitative inspections and reviews of the QA system used by some part of or the entire measurement system. The audits are performed against the QAPP. A checklist is typically generated from the requirements and becomes the basis for the audit. The results of any deficiencies noted during the audit are summarized in an audit report.

Laboratory performance and system audits are performed by the laboratory's QA staff to assess the effectiveness of the quality system. These internal audits are performed on a routine basis. Audits are also performed by certifying agencies. Audit reports and corrective actions are available to NYSDEC for review.

8.1 RESPONSIBILITY, AUTHORITY, AND TIMING

QA audits to be conducted for the project may include system, performance, and data audits. The Project QA Officer will keep a tentative schedule on record that details the number and types of audits.

8.2 FIELD AUDITS

The need for field audits will be determined on a project-specific basis as required by the WA or in the approved work plans for the project. Not all the aspects listed below will be necessary or appropriate for projects for which field audits are specified.

Field performance audits, if specified, will be conducted during the project as field data are generated, reduced, and analyzed. Numerical manipulations, including manual calculations, will be documented. Records of numerical analyses will be legible, of reproduction quality, and sufficiently complete to permit logical reconstruction by a qualified individual other than the originator.

Indicators of the level of field performance include the analytical results of the blank and replicate samples. Each blank analysis will be considered an indirect audit of the effectiveness of measures taken in the field to maintain sample integrity (e.g., field decontamination procedures).

The results of the field replicate analyses are an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

System audits of site activities will be accomplished by an inspection of all field site activities. During this audit, the auditor(s) will compare current field practices with standard procedures. The following elements will be evaluated during a field system audit:

- Field activities conducted in substantial compliance with the Work Plan and FAP;

- Procedures and analyses conducted according to procedures outlined in the QAPP and Addendum;
- Sample documentation;
- Working order of instruments and equipment;
- Level of QA conducted by field personnel;
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding;
- Decontamination procedures;
- Level of efficiency with which each team conducts planned activities at one site and proceeds to the next; and
- Sample packaging and shipment.

After completion of the audit, any deficiencies will be discussed with the field staff and corrections identified. If any of these deficiencies could affect the integrity of the samples being collected, the auditor(s) will inform the field staff and corrections will be implemented immediately. The audit will be performed by the Project QA/QC Coordinator or the Site Manager.

8.3 LABORATORY PERFORMANCE AND SYSTEM AUDITS

As part of the laboratory subcontractor procurement process under the AECOM/NYSDEC Standby Engineering Contract, the laboratory assigned to this project will be verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the matrices and analytical protocols to be used. Therefore, no project-specific audit of the laboratory(s) will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of AECOM and NYSDEC.

8.4 AUDIT PROCEDURES

Prior to an audit, the designated lead auditor prepares an audit checklist. During an audit and upon its completion, the auditor(s) will discuss the findings with the individuals audited and discuss and agree on corrective actions to be initiated. The auditor will then prepare and submit an audit report to the manager of the audited group and the project manager.

The manager of the audited group will then prepare and submit, to the Project QA Officer and the Project Manager, a plan for implementing the corrective action to be taken on non-conformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files.

8.5 AUDIT DOCUMENTATION

A checklist will be completed during each audit so that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures. The checklist will detail the activities to be executed as part of the auditing plan. Audit checklists will be prepared in advance and will be available

for review. Following each system, performance, and data audit, the auditor or QAO will prepare a report to document the findings of the specific audit.

9.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

As part of its quality management system (QMS) program, AECOM provides relevant excerpts and conclusions from data validation reports to the analytical laboratories. The laboratories are therefore made aware of non-critical items and areas where improvement may be made in subsequent NYSDEC ASP work.

The objectives of the corrective action procedures presented below are to ensure that recognized errors in performance of sample and data acquisition lead to effective remedial measures and that those steps are documented to provide assurance that any data quality deficiencies are recognized in later interpretation and are not recurrent.

9.1 RATIONALE

Many times corrective measures are undertaken in a timely and effective fashion but go undocumented. In other cases, corrective actions are of a complex nature and may require scheduled interactions between departmental groups. In either case, documentation in a formal or informal sense can reinforce the effectiveness and duration of the corrective measures taken.

9.2 CORRECTIVE ACTION METHODS

9.2.1 Immediate Corrective Actions

Immediate corrective actions are of a minor or routine nature such as correcting malfunctioning equipment, correction of data transcription errors, and other such activities routinely made in the field, laboratory, or office by technicians, analysts, and other project staff.

9.2.2 Long-Term Corrective Actions

Long-term corrective action will be used to identify and eliminate causes of non-conformances which are of a complex nature and that are formally reported between management groups.

9.2.3 Corrective Action Steps

For long-term corrective actions, steps comprising closed-loop corrective action system are as follows:

- Define the problem;

- Assign responsibility for investigating the problem;
- Investigate and determine the cause of the problem;
- Determine a corrective action to eliminate the problem;
- Assign and accept responsibility for implementing the corrective action; and
- Verify that the corrective action has eliminated the problem.

Non-conformance events associated with analytical work are documented by the laboratories' Non-Conformance Records, which are reviewed and approved by the laboratory's Quality Assurance Manager.

9.2.4 Audit-Based Non-Conformances

Following audits, corrective action is initiated by documenting the audit finding and recommended corrective action on an Audit Finding Report.

9.3 CORRECTIVE ACTION REPORT REVIEW AND FILING

Immediate and long-term corrective actions require review to assure that, during the time of non-conformance, erroneous data were not generated or that, if possible, correct data were acquired instead. Such confirmation and review is the responsibility of the supervisor of the staff implementing the corrective action. Confirmation will be acknowledged by notation and dated signature on the affected data record or appropriate form or by memorandum to AECOM project management.

10.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Fundamental to the success of this QA/QC is the active participation of the Project Manager and the Project QA Officer. The Program QA Officer will be advised of project activities and will participate in development, review, and operation of the project. Project management will be informed of QA activities through the receipt, review, and/or approval of:

- Project-specific QA project plans;
- Corporate and project-specific QA/QC plans and procedures;
- Corrective action notices; and
- Non-conformance records.

Periodic assessment of field and laboratory QA/QC activities and data accuracy, precision, and completeness will be conducted and reported by the laboratory. Items to be included in the QA reports are the summary of results for the performance or the system audit and, where applicable:

- Assessment of adherence to work scope and schedule for the audited task;
- Assessment of the precision, accuracy, and completeness of sample batches and subsequent status of data processing and analyses;
- Significant QC problems and the status of any ongoing corrective actions;
- Changes to the site-specific Work Plan; and
- Status of implementation of the site-specific Work Plan.

Monthly project status reporting to the NYSDEC will include aspects of quality control that were pertinent during the month's activities. Problems revealed during review of the month's activities will be documented and addressed. These reports will include a description of completed and on-going activities, and an indication how each task is progressing relative to the project schedule.

The project manager, through task managers, will be responsible for verifying that records and files related to the work assignment are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

11.0 REFERENCES

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USEPA, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, USEPA Office of Emergency and Remedial Response, OSWER Directive No. 355.3-01, October 1988.

Tables

Table 1
Quality Assurance Project Plan
Korkay Incorporated, Broadalbin, New York

Sample Bottle, Volume, Preservation, and Holding Time Summary

MATRIX/ANALYSIS	Analytical Method ⁽¹⁾	Sample Bottles ⁽²⁾				Minimum Vol Rqd	Preservation ⁽³⁾	Holding Time ^(3,4)		Comment
		Mat'l	Size	Qty	Source			Extraction	Analysis	
Aqueous Samples										
Volatile Organics	SW 846 8260B	G	40 mL	2 or 3	Lab	40 mL	HCl to pH ≤ 2	NA	14 days	7 days if not preserved
Semivolatile Organics	SW 846 8270C	G	1 L	2	Lab	1 L	None	7 days	40 days	
Pesticides	SW 846 8081	G	1 L	1	Lab	1 L	None	7 days	40 days	

(1) More recent versions of SW-846 methods may be used subject to AECOM approval.

(2) Bottles typical.

(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 ship.

G = Glass

SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009

Table 2
Quality Assurance Project Plan
Korkay Incorporated, Broadalbin, New York

Field Sample and QA/QC Sample Off-Site Laboratory Quantity Summary

MATRIX/ANALYSIS	Analytical Method	Laboratory	Reporting Limit -Typical (units as specified)	Matrix Spike (MS) or LCS	MS Duplicate or Matrix Duplicate	Field Duplicate	Field Equipment Blank ⁽¹⁾	Trip Blank ⁽²⁾
Aqueous Samples								
Volatilic organics	SW 846 8260B	TestAmerica	1.0 - 5 µg/L (typical)	1 pair/20 samples	1 pair/20 samples	1/20 environmental samples	1/20 field samples or 1/week	1/cooler
Semivolatile organics	SW 846 8270C	TestAmerica	10 - 20 µg/L (typical)					-
Pesticides	SW 846 8081	TestAmerica	33 µg/L					-

(1) One rinsate blank will be collected for every 20 field samples collected or one per week, whichever is more frequent, for each type of non-dedicated and/or non-disposable sampling equipment.

(2) One trip blank shall be included in each shipment containing aqueous samples for VOC analysis except where the only aqueous samples for VOC analysis in the shipment are quality control samples.

Appendix J
Site Management Forms

SITE NAME: **Korkay**

SITE ID.: 518014

MONITORING WELL FIELD INSPECTION LOG

INSPECTOR: _____

DATE/TIME: _____

WELL ID.: _____

WELL VISIBLE? (If not, provide directions below)	YES	NO
WELL COORDINATES? NYTM X _____ NYTM Y _____		

PDOP Reading from Trimble Pathfinder: _____ Satellites: _____
 GPS Method (circle) Trimble And/Or Magellan

WELL I.D. VISIBLE?	YES	NO
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back).....		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: **ASW**

SURFACE SEAL PRESENT?	YES	NO
SURFACE SEAL COMPETENT? Concrete is cracked and heaved at grade, stick up broken off.		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

HEADSPACE READING (ppm) AND INSTRUMENT USED..... _____
 TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) _____
 PROTECTIVE CASING MATERIAL TYPE: _____
 MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): _____

LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes, describe below)		
WELL MEASURING POINT VISIBLE?		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): _____
 MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): _____
 MEASURE WELL DIAMETER (Inches): _____
 WELL CASING MATERIAL: _____
 PHYSICAL CONDITION OF VISIBLE WELL CASING: _____
 ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE _____
 PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES..... _____

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

REMARKS:

Monitoring Well Purging / Sampling Form

Project Name and Number: _____

Monitoring Well Number: _____ Date: _____

Samplers: _____

Sample Number: _____ QA/QC Collected? _____

Purging / Sampling Method: _____

- 1. L = Well Depth: _____ feet
- 2. D = Riser Diameter (I.D.): _____ feet
- 3. W = Depth to Water: _____ feet
- 4. C = Column of Water in Well: _____ feet
- 5. V = Volume of Water in Well = $C(3.14159)(0.5D)^2(7.48)$ _____ gal
- 6. 3(V) = Target Purge Volume _____ gal

D (inches)	D (feet)
1-inch	0.08
2-inch	0.17
3-inch	0.25
4-inch	0.33
6-inch	0.50

Conversion factors to determine V given C

D (inches)	1-inch	2-inch	3-inch	4-inch	6-inch
V (gal / ft)	0.041	0.163	0.37	0.65	1.5

Water Quality Readings Collected Using _____

Parameter	Units	Readings						
Time	24 hr							
Water Level (0.33)	feet							
Volume Purged	gal							
Flow Rate	mL/min							
Turbidity (+/- 10%)	NTU							
Dissolved Oxygen (+/- 10%)	%							
Dissolved Oxygen (+/- 10%)	mg/L							
Eh / ORP (+/- 10)	MeV							
Specific Conductivity (+/- 3%)	mS/cm ^c							
Conductivity (+/- 3%)	mS/cm							
pH (+/- 0.1)	pH unit							
Temp (+/- 0.5)	C°							
Color	Visual							
Odor	Olfactory							

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

Appendix K
Field Activities Plan
(FAP)



Environment

Prepared for:
Superfund Standby Program
NYSDEC
Albany, NY

Prepared by:
AECOM
Latham, NY
October 2015

Field Activities Plan (FAP)

Korkay Incorporated
Broadalbin, New York 12025
Work Assignment D007626.20

Prepared for:

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by:

AECOM Technical Services Northeast, Inc.
40 British American Boulevard
Latham, New York 12110

Field Activities Plan (FAP)

Korkay Incorporated
Broadalbin, New York 12025
Work Assignment D007626.20



Prepared By: Greta White



Reviewed By: Walter Howard

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Table 1 Summary of Groundwater Monitoring Schedule

1.0 Introduction

This Field Activities Plan (FAP) describes typical field activities to be conducted by AECOM Technical Services Northeast, Inc (AECOM) under New York State Department of Environmental Conservation (NYSDEC) Standby Contract D007626.

1.1 Work Assignment Objectives

AECOM has been issued Work Assignment #D007626-20 under the NYSDEC State Superfund Standby Program. The site under this work assignment is Korkay, Incorporated (Site #5-18-014). The objective of this work assignment is to monitor the effectiveness of the remedial action and the Site's groundwater quality.

Field activities are planned and conducted in general accordance with NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010), the United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

This site specific FAP is intended to be a companion document to the Site Management Plan (SMP) for this work assignment.

1.2 Site Description and Background Information

Available site information is presented in the SMP. Information presented in the SMP includes 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
- Any other relevant information

2.0 Field Activities

The scope of work was established in the work assignment as documented in the SMP and will include the following:

- Monitor the effectiveness of the remedial action; and
- Monitor groundwater quality.

To accomplish these objectives, the field subtasks described in this Site specific FAP will be utilized. Additional methodology information will be provided in the Quality Assurance Project Plan (QAPP). Unless otherwise noted, it is assumed that all field work will be completed at level D personal protection in accordance with the Health and Safety Plan (HASP). Field activities will be monitored by a qualified AECOM representative(s).

2.1 Mobilization

Following authorization to proceed with the field activities from NYSDEC, AECOM and/or any subcontractors will mobilize necessary materials and equipment to the site. These primarily involve relatively small scale sampling equipment.

A project kick-off meeting will be held prior to initiating field work to orient field team members 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

All work to be completed at this site will be performed in Level D personal protection. The site-specific HASP has been submitted concurrently with the SMP.

3.0 Groundwater Monitoring

Groundwater sampling will be performed to monitor the effectiveness of the remedy and assess groundwater quality. Laboratory analysis will be performed by a NYSDEC callout contractor laboratory. Samples will be analyzed for volatile organic compounds (VOCs) via Environmental Protection Agency (EPA) Method 8260B, semi-volatile organic compounds (SVOCs) via EPA Method 8270C and pesticides via EPA Method 8081A. The analytical parameters will be changed if deemed appropriate by the NYSDEC. All analytical data will be submitted to the NYSDEC in the standardized electronic data deliverable (EDD) format that is required for all data submitted.

Groundwater samples will be collected from five on-site wells quarterly for a period of two years post remediation (in-situ chemical oxidation injections) to monitor the effectiveness of the remedy. Groundwater samples will be collected from 15 wells every fifth quarter to monitor overall groundwater quality. **Table 1** lists the wells to be sampled for these monitoring purposes.

3.1 Groundwater Sample Collection

Groundwater sampling will be performed to evaluate the effectiveness of the remedial actions and to monitor groundwater quality. The rationale, locations, wells, and analytical parameters are specified in the SMP and QAPP addenda.

3.1.1 Low Flow Sampling Technique

Unless specified otherwise in the SMP 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).

A bladder pump (or similar submersible pump) will be used to purge the wells. The pump intake will be set at the midpoint of the screened interval. The pump will be operated at a flow rate of 300 to 500 milliliters per minute (mL/m). Dedicated Teflon or Teflon-lined tubing will be used for groundwater sample collection. Field parameters will be recorded on the Well Sampling Form (provided in Appendix I of the SMP) every five minutes during purging and will include:

- flow rate (mL/min)
- depth to water (0.01 ft)
- temperature (degrees Celsius)
- pH (dim)
- specific conductance (millisiemens per centimeter [ms/cm])
- DO (milligrams per liter [mg/L])
- ORP (millivolts [mV])
- turbidity (NTU)

A flow-through cell will be used to obtain temperature, pH, specific conductance, DO, ORP, and turbidity. Purging will be considered complete when the indicator parameters have stabilized over three consecutive readings. Stabilization parameters are:

- purge rate: between 300 and 500 mL/m;
- depth to water: less than 0.3 ft drawdown during purging;
- pH: ± 0.1
- conductivity: $\pm 3\%$
- DO: $\pm 10\%$ (mg/L)
- ORP: ± 10 mV and
- Turbidity: less than 50 NTU.

If stabilization is not achieved after an hour of purging, the field team leader will notify the AECOM project manager who will contact the NYSDEC project manager for further instruction (unless default contingencies are established in advance).

During sample collection, the flow-through cell will be disconnected and the sample tubing discharge will be directed into the laboratory supplied sample containers. The flow rate will be decreased to approximately 100 mL/m during sample collection for VOC analysis. Groundwater samples will be packaged in accordance with Section 5.6 and submitted to the laboratory for analysis.

3.1.2 Well Volume Sampling Technique

Many long term monitoring sites utilize the volumetric approach for collecting groundwater samples. There are two techniques for determining when it is appropriate to collect samples. One method stipulates that a predetermined well volume be removed prior or sampling, typically three to five casing volumes. The second method relies on stabilization of field parameters similar to the low flow technique as detailed in Section 3.1.1.

For both techniques, the static water level will be recorded prior to purging and the volume of water in one casing volume will be calculated. If the static water level is above the screen, the pump will be set near the top of the water column and slowly lowered into the screened interval during the purging process to completely remove any stagnant casing water above the screen. If the screen is exposed, the pump should be set at a sufficient depth below the water table to allow for drawdown during purging. In either case, the pump should not be allowed to touch the bottom of the well or draw in sediment from the bottom of the well casing. The pumping rate should not produce excessive turbulence and typically will not exceed one gallon per minute. Water quality parameters will be collected approximately every casing volume. The depth to water will be monitored during purging to prevent the dynamic water level from dropping below the pump intake. If using water quality parameters to determine stabilization, the sample can be collected once the parameters have stabilized for three consecutive readings. The sample can be collected either by Teflon bailer or through the pump if suitable for the analysis required.

4.0 Decontamination and Waste Management

4.1 Equipment Decontamination

To avoid cross contamination, sampling equipment, defined as any piece of equipment which may contact a sample, will be discarded or decontaminated after each use. Cross contamination is minimized by the use of vendor-decontaminated, dedicated, or disposable equipment to the extent practical.

Field equipment rinsate blanks are generated and analyzed to monitor the effectiveness of field decontamination procedures, as discussed in the QAPP.

4.1.1 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as pumps 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.

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 air line 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 rinse, air dry.

4.1.2 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the HASP. This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

4.2 Waste Management

Waste 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 waste. Personal protective equipment and disposable sampling equipment will be placed in plastic garbage bags for disposal as a solid waste.

5.0 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 include chain-of-custody (COC) forms, Well Sampling Forms and Well Inspection Forms. Example forms are provided in Appendix I of the SMP.

5.1 Field Log Books

Field log books will be prepared and maintained throughout the course of the work assignment. Only bound, weatherproof field log books will be used by personnel working on this NYSDEC project. The log books will be turned in for copying/filing/tracking when complete.

Each log book will be labeled on the front cover in indelible ink with the following designation: "Korkay Inc./Project Type, NYSDEC Work Assignment D007626-20, AECOM Project Number 60273289."

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.

Entries will be made in the following format. Documentation and reporting of events and activities will be made in chronological order on the right page of an open log book. The left page of the log book will be used for extemporaneous reporting, such as sketches, tables, providing details or comments on events reported sequentially, or interpretations, and notes identifying use of any other field documentation such as COCs and Standard Forms.

Standard Forms have been adopted in this FAP to facilitate the collection of consistent data (See Appendix I of the SMP). This will preclude detailed documentation field 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.

When an individual log book is full, the log book will be submitted to the AECOM 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.

5.2 Standard Forms

All non-bound field records (e.g., Well Condition Forms, Sampling Forms, COCs) 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 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. A hard copy of the data, and any graphical representation produced by logging software, will also be printed out and duplicated. Examples of forms typically used are provided in Appendix I of the SMP.

5.3 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 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
FB	Field (Rinsate) Blank
DUP	Field Duplicate
TB	Trip Blank
MS/MSD	Matrix Spike/ Matrix Spike Duplicate

Field blanks and tip 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
DUP-110504	Duplicate collected on 11/5/04
FB-110502	Field blank associated with water samples collected on 11/5/02
TB-110503	Trip blank associated with samples shipped 11/5/03.

5.4 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 (AECOM);

Sample date and time;

Sampler's initials;

Sample preservation; and

Analysis required.

5.5 Sample Chain of Custody

At the time of the sampling, a field team member will record the sample information in the field log book, well sampling form, and on a COC form. The sample information recorded in the log books will be at least as detailed as that recorded on labels, and should indicate the type of sample (e.g., groundwater), sample preservation, and sampling location, in sufficient detail as to allow re-sampling at the same location. Errors on forms or logbook entries will be stricken with a single line and corrected, with the date and initials of the person making the correction.

After samples are collected, the field team member will immediately place the filled containers in coolers and iced to 4 degrees Celsius ($^{\circ}$ C). Samples will be preserved as required and specified in the QAPP. The field team will maintain custody of the samples until they are shipped to the laboratory. The entries on the COC form will correspond to the field log book, standard forms, and sample labels.

Original white copies of COCs will be forwarded to the laboratory. Yellow copies and associated shipping air bills will be maintained by the Field Supervisor with all other documentation until provided to the Project Manager. COCs will be copied to the field file weekly or as otherwise specified in the SMP. Yellow copies will be filed by the Project Manager or designated representative on a weekly basis (at a minimum) in the Project File for permanent storage.

5.6 Sample Packaging and Shipping

Samples collected for laboratory analysis will be shipped by a commercial overnight delivery service to the laboratory on the day of collection (if possible; otherwise samples will be shipped on the day after collection), following proper identification, chain-of-custody, preservation, and packaging procedures. Samples which require maintenance at 4° C (essentially all aqueous and non-aqueous samples submitted for chemical analysis) which are collected and shipped on a Friday must be delivered to, and accepted by, the laboratory on Saturday; note that it may be necessary to arrange this in advance.

Sample packaging and shipping procedures are summarized as follows:

A properly completed COC form will accompany each sample shipment. The sample identifiers will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

Samples will be properly packaged to avoid breakage, stored on ice at 4° C for shipment and dispatched to the appropriate laboratory for analysis. (In the event that samples must be held overnight prior to shipment, the temperature of the cooler and presence of sufficient ice will be checked and new ice added prior to shipment.) A signed COC form will be enclosed and secured to the inside top of each sample box or cooler. The COC (white copy), a cooler receipt form (if

applicable), and any additional documentation will be placed in a plastic bag to prevent them from getting wet, and one copy will be retained by the field team leader.

Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. Signed custody seals will be covered with clear plastic tape. The cooler will be taped shut with strapping tape in at least two locations.

Samples will be transported to the laboratory by a commercial overnight carrier (e.g., FedEx) unless other arrangements are made on a project-specific basis (e.g., laboratory courier sample pickup; or hand delivery of samples to the laboratory by AECOM personnel).

6.0 References

NYSDEC, 2010a. 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, 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. USEPA Office of Solid Waste and Emergency Response (OSWER), Office of Research and Development. Robert Puls and Michael Barcelona. EPA/540/S-95/504. April, 1996.

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
Korkay Incorporated, Broadalbin, New York

Summary of Groundwater Monitoring Schedule

Monitoring Well ID	Post-Remediation Monitoring	Groundwater Quality Monitoring
ASW		X
MW-16 (FLUSHMOUNT)		X
MW-17	X	
MW-18	X	
MW-19	X	
MW-20	X	
MW-21	X	
MW-22	X	
MW-23	X	
MW-24	X	
K-2		X
K-3		X
MW-8D		X
MW-8S		X
MW-15D		X
MW-15S		X
VEW-1		X
VEW-2		X
VEW-3		X
VEW-4		X

Notes:

Sample analysis will be performed by a NY SDEC callout contractor laboratory for volatile organic compound (VOC) analysis via Environmental Protection Agency (EPA) Method 8260B, semi-VOCs (SVOCs) via EPA Method 8270C and pesticides via EPA Method 8081A.