August 9, 2024
Project No. 034390

VIA email: Justin.Starr@dec.ny.gov

Justin Starr, P.G.
Engineering Geologist
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
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Re: Canastota Supplemental Work Plan
Canastota Non-Owned Former MGP, National Grid
Canastota, New York

On behalf of National Grid, GEI Consultants Inc. DBA GEI Consultants Engineering, Geology, Architecture & Landscape Architecture (GEI) is providing this Supplemental Work Plan which summarizes the scope of work and proposed site preparation activities for the 2025 utility and sanitary sewer (SAN) relocation activities associated with the Canastota Non-Owned Former MGP Site, in response to a May 6, 2024, email request from Justin Starr at the New York State Department of Environmental Conservation (NYSDEC). The email requested that this work plan should outline the proposed site preparation activities and include appropriate appendices for: a Community Air Monitoring Plan (CAMP) and odor controls, Health and Safety Plan (HASP), daily reporting, and soil management work plans in the event that manufactured gas plant (MGP) contamination is encountered.

Scope of Work

The proposed work involves rerouting an existing sanitary sewer force main to a location outside the future remedial work area. This includes abandoning a portion of the existing sanitary sewer force main and installing a new force main outside of the future redial work limits. The scope also includes removing existing underground (UG) electric service lines and utility pole from within the future remedial work area and installing a new utility pole and associated service lines. A new permanent underground electric line will be installed from a new utility pole to the lift pump station and a new overhead electric line will be installed from the new pole to the Department of Public Works (DPW) Garage. The existing conditions at the Site are illustrated in Figure 1 and the proposed locations of the sanitary sewer force main and electric services are shown in Figure 2. This work is being conducted in advance of the proposed remedial construction at the Site documented in the NYSDEC issued Decision Document.

Sanitary Sewer Force Main

Installation will include a new manhole adjacent to west side of the existing sanitary lift pump station to tie into the existing sanitary sewer. Additional manholes will be installed at the approximately 90-degree turn along the proposed alignment near the southeast corner of the property and along the existing alignment near the Lenox Ambulance entrance south of the DPW Garage. This will provide the additional elevation change needed to maintain an adequate slope for the new alignment shown on Figure 2. The sanitary sewer pipe will be installed at a constant slope along the entire alignment. Utilities will be marked out prior to performing any excavation and soft dig methods will be used to expose UG electric, gas, water, or other buried utilities, if necessary, based on the existing site plans and the utility mark out. As part of the Work the existing wooden shed adjacent to the lift pump station will be removed.

The Contractor for the Work associated with the sanitary sewer will be required to provide an Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) trained crew to install up to 330 linear feet (LF) of 8" SDR35 sanitary sewer from the existing pumping station, located on the east side of the site to a new manhole located southwest of the Department of Public Works (DPW) garage along the existing alignment.

Work will include installation of manholes along the existing and proposed sanitary sewer force main alignments, abandoning the existing alignment, excavating a trench for new pipe installation, bedding the trench, installing the new sanitary force main pipe, backfilling, and compacting the trench in accordance with New York State Department of Transportation (NYSDOT) requirements. Excavated material determined to be contaminated by the Construction Manager with MGP waste such as coal tar will be contained in roll-off containers for testing and proper disposal. The Contractor will provide temporary shoring as required in accordance with OSHA requirements and will install utility detection tape in the trench during backfill.

New sewer pipe will be installed prior to abandoning the existing alignment and making the required connections to mitigate the need for bypass pumping of the sanitary sewer. Minimal flow has been observed in the force main and the current understanding as conveyed by the Village of Canastota is that the sanitary sewer only services a few residences. The lift pump station has some storage capacity that may be utilized in leu of bypass pumping depending on the amount of time required to take the existing system offline and connect to the new alignment.

The Contractor will coordinate outages at the pumping station with the Village of Canastota DPW and Water and Sewer Commission prior to starting work. GEI will perform Community Air Monitoring Program (CAMP) activities at the perimeter of the work and the Contractor will be responsible for implementing their own air monitoring program as well. Once the new pipe has been installed and approved, the existing sanitary sewer force main will be permanently abandon. A portion of the abandon alignment will be removed during the future remedial excavation.

Electric Lines

Installation of the new utility pole, pole mounted transformers, and overhead electric line from the existing pole on the south side of Canal Street to the new pole as shown on Figure 2 will be performed

by National Grid. An electrical Contractor will then be responsible for obtaining necessary permits and field verifying locations of the electric meters that provide service to the DPW Garage and the sanitary sewer lift pump station. The electrical Contractor will execute the work discussed below prior to National Grid connecting the newly installed wires to the transformers finalizing the installation. Utility work will be coordinated with National Grid and the Village of Canastota.

To re-establish electrical service to the sanitary sewer lift pump station the electrical Contractor will install up to 150 LF of 4-inch Schedule (Sch) 80 PVC conduit from the existing lift pump station located on the east side of the site to the new utility pole located south of the existing chain link fence. The conduit will be installed to meet the minimum required burial depth. A trenching machine will be used to establish a narrow trench for conduit installation per standard practice. Utility identification tape will be installed above the conduit during backfill. MGP impacted soils are not anticipated to be encountered along the proposed UG electrical alignment based on previous site exploration activities. The UG electric installation work will occur outside of the limits established for the future remediation.

PVC conduit will be extended from the buried conduit up the side of the new utility pole as required by National Grid. The Contractor will pull wire for the electrical service to the lift pump station through the conduit; the wire size, and type have yet to be determined by National Grid. Additional wire will be coiled and left at the top of the PVC on the utility pole to allow for National Grid to attach the new service wire to the transformers.

To re-establish electrical service to the DPW Garage the electrical contractor will install a new meter box, conduit and riser mast with guywire on the DPW garage at the existing meter box location. The riser mast is required to meet National Grid's requirements for overhead clearance in anticipation of the future remediation work to occur beneath the electric line. Once the Contractor has installed wire from the meter through the conduit to the top of the new riser mast, National Grid will install the new OH electric line and finish the connection to restore the electric service to the DPW Garage. Additionally, the contractor will install 4 bollards around the new utility pole and utility pole guy wire for protection from vehicles.

Prior to and after completion of the connections to the new service wires the new lines will be tested for continuity and functionality. The Contractor will be responsible for completing an electric inspection by an authorized party and submit the inspection to the Canastota Code Enforcement Officer.

Outages will be coordinated with National Grid and the Village of Canastota DPW prior to starting work. CAMP activities will be performed by GEI in addition to the Contractor's air monitoring program. Once the new lines have been installed, tested, and approved, the prior services will be permanently abandoned and the old utility pole will be removed.

Contractor Deliverables

- Copy of Permit(s)
- Health and Safety Plans and associated documentation
- Trenching/Excavation Plans
    - Equipment

    - Temporary shoring, if required
    - Material Cutsheets/Data Sheets
        - PVC pipe and fittings for electrical conduits
        - Wire gauge, type and length
        - Conduit and fittings
        - Wire and electrical connections
        - Riser mast and guy wire
        - Pipe and manholes for sanitary sewer
        - Backfill materials
- Test Plan
- As-Built Survey
- Copy of inspection documentation

The scope of work for the planned utility and sewer relocation is further depicted in Figure 2.

Specifications & Drawings

The following specifications are anticipated to be developed for the Work:

- Summary of Work
- Work Restrictions
- Utility Sources and Protection
- Price and Payment
- Project Management and Coordination
- Submittal Procedures
- Health and Safety Requirements
- Quality Requirements
- Regulatory Requirements - Permits
- Temporary Erosion and Sediment Controls
- Temporary Environmental Controls
- Closeout Procedures
- Surveying
- Selective Demolition
- Decontamination
- Contaminated Materials Management
- Excavation
- Backfill and Grading
- Restoration and Planting

The following Drawings are anticipated to be developed for the Work:

- Cover Sheet
- Notes and Legend
- Existing Conditions Plan
- Limit of Work / Staging Plan
- Erosion and Sedimentation Control Plan
- Utility Relocation Plan
- Demolition and Protection Plan
- Cross sections
- Sections and Details

Community Air Monitoring Plan

A CAMP will be implemented during the activities, as required by the New York State Department of Environmental Health (NYSDOH), at sites where ground-intrusive activities may result in airborne release of contaminants. Community air monitoring will be performed to measure total organic compounds (VOCs) and particles (dust), and the CAMP provides information regarding the procedures to monitor and control airborne releases and identifies Action Levels. The site-specific CAMP is included in Appendix A.

Odor Controls

A description of potential sources of odors and methods to be used for odor control are presented in the CAMP, described above.

Health and Safety Plan

A Health and Safety Plan (HASP) will be implemented during all ground-intrusive activities. The HASP identifies potential hazards that may be encountered during the investigation and establishes policies and procedures to minimize accidents, which may result from project activities, site conditions, or adverse weather conditions. The HASP can be found in Appendix B.

Daily Reporting

Site activities will be documented daily, providing information to the daily report template in Appendix C.

Soil Management Work Plan

Although no impacted materials are expected to be encountered during the activities, a Soil Management Work Plan has been prepared for use on an as-needed basis and is provided in Appendix D.

Field Sampling Plan

Although environmental sampling is not expected to take place during the activities, a Field Sampling Plan (FSP) has been prepared for use on an as-needed basis at the Site. It presents the methods and procedures to be used to perform field activities at the Site. The FSP can be found in Appendix E.

If you have any questions, please feel free to contact me at 607.216.8976.

Sincerely,

GEI Consultants, Inc. DBA GEI Consultants Engineering,
Geology, Architecture & Landscape Architecture

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DK/PS:jam
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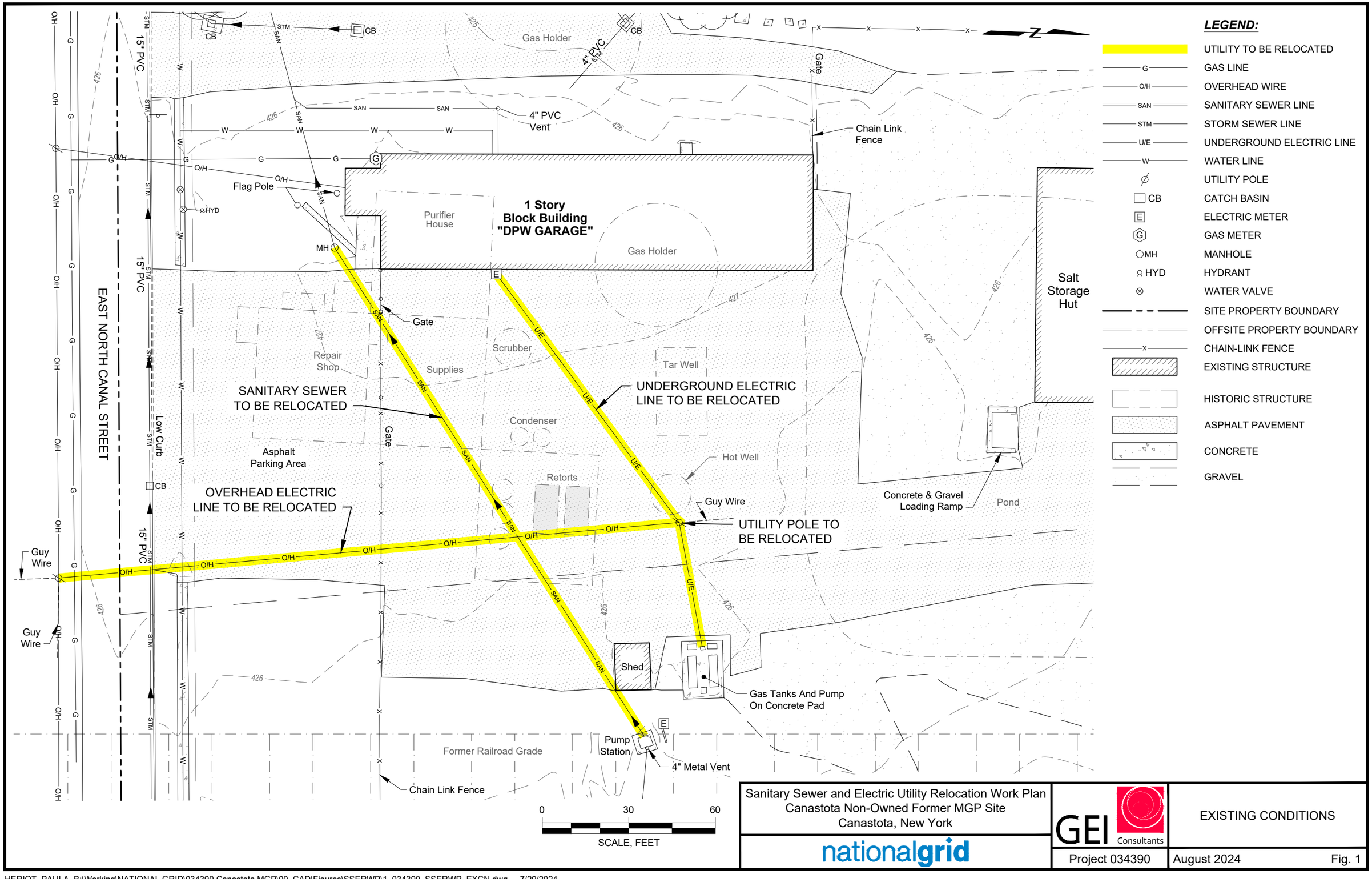
Figure 1 – Existing Conditions
Figure 2 – Relocated Utilities

Appendices

Appendix A	Community Air Monitoring Plan
Appendix B	Health and Safety Plan 2024
Appendix C	Daily Reporting
Appendix D	Soil Management Work Plan
Appendix E	Field Sampling Plan



Sanitary Sewer and Electric Utility Relocation Work Plan
Canastota Non-Owned Former MGP Site
Canastota, New York

nationalgrid

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EXISTING CONDITIONS

Project 034390 | August 2024 | Fig. 1

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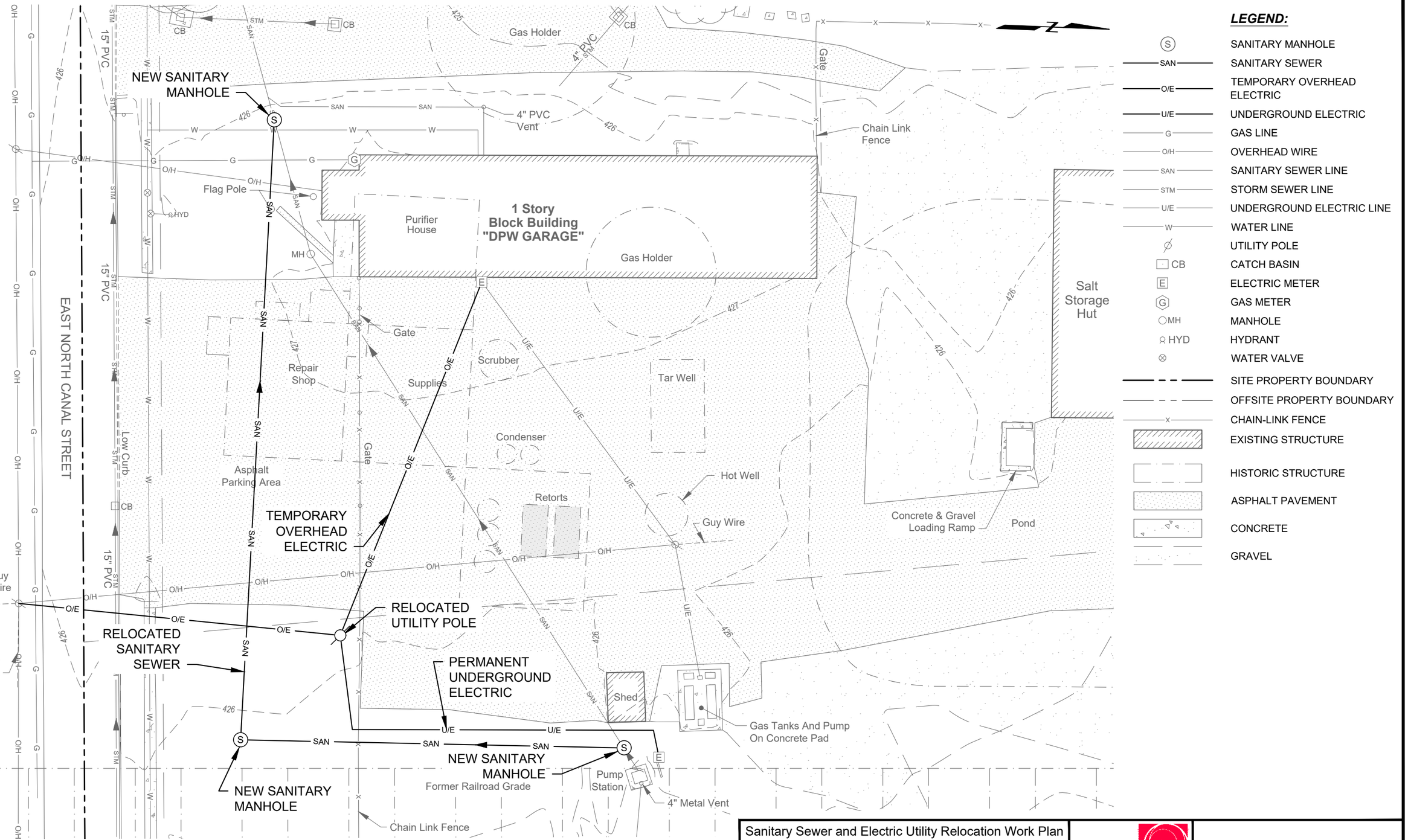

LEGEND:

- SANITARY MANHOLE
- SANITARY SEWER
- TEMPORARY OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- GAS LINE
- OVERHEAD WIRE
- SANITARY SEWER LINE
- STORM SEWER LINE
- UNDERGROUND ELECTRIC LINE
- WATER LINE
- UTILITY POLE
- CATCH BASIN
- ELECTRIC METER
- GAS METER
- MANHOLE
- HYDRANT
- WATER VALVE
- SITE PROPERTY BOUNDARY
- OFFSITE PROPERTY BOUNDARY
- CHAIN-LINK FENCE
- EXISTING STRUCTURE
- HISTORIC STRUCTURE
- ASPHALT PAVEMENT
- CONCRETE
- GRAVEL

Sanitary Sewer and Electric Utility Relocation Work Plan
Canastota Non-Owned Former MGP Site
Canastota, New York

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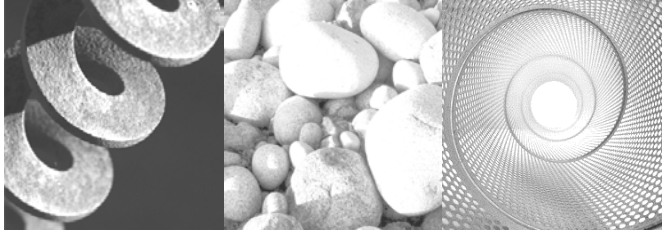
RELOCATED UTILITIES

Project 034390 | August 2024 | Fig. 2

Appendix A Community Air Monitoring Plan



GEI Consultants

Consulting
Engineers and
Scientists

Community Air Monitoring Plan

Canastota Non-Owned Former MGP
Canastota, New York
NYSDEC Site #: V00477
Index #: D0-0001-0011

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August 2024
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Table of Contents

Abbreviations and Acronyms iii

1. Introduction 1

2. Air Monitoring Equipment and Methods 2
2.1 Monitoring Locations 2
2.2 Air Monitoring Equipment 2
2.2.1 TVOC Monitoring Equipment 3
2.2.2 Particulate (Dust) Monitoring Equipment 3
2.2.3 Data Logger Equipment 3
2.3 Odor Monitoring 4

3. Threshold Levels and Mitigation Control Measures 5
3.1 Potential Sources of Odors and TVOCs 5
3.2 Monitoring Threshold Levels and Mitigation Control Measures 5
3.3 General Site Controls 6
3.4 Secondary Site Controls 7
3.5 Building Controls 7

4. Documentation and Reporting 8

Tables

1. Emergency Contacts and Telephone Numbers 4
2. Air Monitoring Response Levels and Actions 5

Appendices

A. Community Air Monitoring Daily Field Report Form

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Abbreviations and Acronyms

CAMP	Community Air Monitoring Plan
DPW	Department of Public Works
GEI	GEI Consultants, Inc.
HASP	Health and Safety Plan
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photo-ionization Detector
ppm	Parts per Million
PM_{10}	Particulate Matter of 10 Microns in Diameter or Less
SVOC	Semi-Volatile Organic Compounds
TVOC	Total Volatile Organic Compounds
$\mu g/m^3$	Micrograms per cubic meter

1. Introduction

This document presents the Community Air Monitoring Plan (CAMP) that will be implemented during the utility relocation located at the Canastota Non-Owned Former manufactured gas plant (MGP) site, located in the Village of Canastota, New York (the Site). A CAMP is required by the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) at sites where ground-intrusive activities may result in airborne release of contaminants. Towards that end, community air monitoring will be performed for total volatile organic vapors (TVOCs), and for particulates (dust).

The Site is located on East North Canal Street in the Village of Canastota, New York. The former MGP operations on-Site were conducted within a parcel of land that is currently owned by the Village of Canastota. This parcel is currently used by the Village of Canastota Department of Public Works (DPW) for its garage and equipment facility, and is covered by the garage building, a parking lot, and gravel- or grass-covered areas.

This CAMP specifically applies to the utility relocation phase of work for the Site. The fieldwork involves the installation and connections of a new, permanent sanitary sewer force main, permanent underground electric lines, and a temporary overhead electric line. This work is being conducted in advance of the environmental remedial construction at the Site. Community air monitoring will be performed during the excavation, removal of old equipment and installation of new sanitary sewer force main and electric lines.

All utility relocation is proposed to happen outside of the environmental remedial area. CAMP Monitoring is being implemented in case any unknown contaminates are found during the utility relocation.

The objectives of this CAMP are to:

- Minimize the emission of TVOCs and particulates during ground-intrusive activities.
- Provide an early warning system so that potential emissions can be controlled on Site at the source.
- Document the measurements of TVOCs and particulates during working hours.

This CAMP is a stand-alone document of GEI's site-specific Health and Safety Plan (HASP). The HASP is directed primarily toward protection of on-Site GEI employees within the designated work zones.

2. Air Monitoring Equipment and Methods

This section provides instructions for conducting the CAMP. Discussed are the equipment to be used and what monitoring is to be performed. For the Site, TVOCs and particulates (dust), in the form of 10 microns or less (PM_{10}), will be measured during the installation/excavation of the sanitary sewer force main and installation/excavation of a new utility pole, PVC conduit, and overhead electrical line.

2.1 Monitoring Locations

Two community air monitoring locations will be established at the start of each workday: one location that is upwind of the work area, and one location that is downwind of the work area/exclusion zone. The purpose of the upwind station will be to assess the background concentration of TVOCs and PM_{10} at the Site. The downwind monitoring station will be used to assess compliance with the NYSDEC/NYSDOH specified Action Levels for VOCs and PM_{10}. The upwind TVOC and PM_{10} measurements will be subtracted from the downwind measurements to compare the downwind instrument readings to the CAMP Action Levels.

The location of each monitoring station will be noted on the CAMP Daily Field Report Form along with the start and stop time of the monitoring. A sample form is provided in Attachment A. The locations of the instruments may be changed during the day to adapt to changing wind directions.

If the work zone is less than 20 feet from the nearest occupied building, the downwind air monitoring station will be positioned at the air intake for the building or at the most sensitive exposure point for the downwind receptors. Background measurements inside the building will be made prior to the start of work. If exceedances of the action levels are measured at the outside wall of the building, additional measurements will be made inside the building using portable meters.

If necessary, precautions to minimize the release of VOCs and particulates will be taken at the work zone, and engineering or work controls used to protect the downwind receptor. These controls for minimizing releases from the work zone are discussed in Section 3.

2.2 Air Monitoring Equipment

Each monitoring location will include a photo-ionization detector (PID), particulate meter, and a data logging device with modem communication for data transmittal and alerting. Equipment will be mounted on a tripod in a vented protective case and programmed to record 15-minute averages. The monitoring instruments will be calibrated at the start of each

workday and again during the day if the performance of an instrument is in question. The time and method of calibration will be noted on the Daily Report Form (Attachment A). Real-time TVOC and PM_{10} measurements will be transmitted to a centralized data logger system. GEI personnel will check the instrumentation at each location regularly during the workday to ensure that they are operating properly.

2.2.1 TVOC Monitoring Equipment

TVOC monitoring will be performed using PIDs (RAE Systems™ MiniRAE 3000 or equivalent) equipped with a 10.6 eV bulb. The PIDs will be connected to a data logger in each monitoring station. The data logger will use recorded 1-minute data to calculate 15-minute running average concentrations. An email or text alert will be sent to GEI field personnel if the measured 15-minute average TVOC concentration exceeds 5 ppm.

2.2.2 Particulate (Dust) Monitoring Equipment

Particulate monitoring will be performed using MetOne ES-642 aerosol (dust) meters affixed with cyclone inlets that are set to measure PM_{10}. The equipment used will be set to record 15-minute running average concentrations for comparison to the Response and Action Levels.

In addition to the instrument readings, fugitive dust migration will be visually assessed during all work activities, and observations will be recorded in the field book. Per NYSDEC requirements, visible dust migration is not permissible. If visible dust is observed to be migrating from the work zone, the work will be stopped, and dust control measures implemented.

2.2.3 Data Logger Equipment

All TVOC and PM_{10} data will be stored in data loggers located at each monitoring station. Real-time data from each station will be sent via cellular modem, to a central computer system for monitoring and analysis. In the event of severe weather or power loss at the Site, data recording and/or recovery may be affected. GEI personnel will discuss whether or not monitoring should continue during severe weather events.

All data will be downloaded to a computer system and saved for review. The data will be provided to the NYSDEC and/or the NYSDOH upon request at any stage of the project.

If TVOC or PM_{10} Response and Action Levels are exceeded during the workday, observed construction activities and the implemented mitigation control measures will be recorded on the Daily Field Report and reported to the on-Site NYSDEC representative. If an on-Site representative is not present, exceedances will be noted in the daily report to the NYSDEC project manager within one business day.

Table 1. Emergency Contacts and Telephone Numbers

Fire, Police, Ambulance		911
NYSDEC Contact	Justin Starr: Project Manager	(518) 402-9662 (office) (585) 943-1228 (cell)
GEI Contacts	Dan Kopcow: Project Manager Chris Gordon: Air Monitoring Practice Leader	(607) 206-9075 (cell) (860) 625-0633 (cell)
National Grid Contact	Steven Stucker: Project Manager	(315) 428-5652 (office) (315) 247-6490 (cell)

2.3 Odor Monitoring

The field investigation personnel will record observations of odors generated during the implementation of the utility relocation. If odors attributable to the exposing of impacted media are observed in the work area during intrusive activities such excavation/trenching of utility lines, observations will also be made at the downwind limit of the Site. The observations will be made to assess the potential for significant odors reaching onsite receptors or being transmitted off site. Downwind odor monitoring will be performed in conjunction with the PID, and dust monitoring program described in this CAMP.

Upon detection of odors at the Site perimeter, site controls, starting in the work area, will be implemented. The mitigation control measures described in Section 3 will be used to abate the odors. Note that the goal of the Odor Mitigation Plan is to minimize and to prevent, where practicable, the off-site migration of odors. Due to the short distances between any work area at the site and the on-site receptors property line, site controls will be implemented proactively when odors are detected in the breathing zone at any work area.

There is no Action Level specified for odors. In the event that odors persist at the downwind receptors or property line after control measures are carried out, the odor conditions will be discussed with the National Grid and NYSDEC project managers. If necessary, the odor conditions and significance will be discussed with the DPW site staff or neighbors.

3. Threshold Levels and Mitigation Control Measures

This section outlines the monitoring threshold levels and procedures to be used to control TVOCs, odors, and particulates that may be generated during the utility relocation. While the utility relocation is located outside of the known area of contaminants, the primary actions that may generate odors are the excavations/trenching needed for utility replacement. The remainder of this section is intended to provide Site managers, representatives of NYSDEC and NYSDOH, and the public with information summarizing typical odor control options, and to provide some guidance for their implementation. A description of potential sources of odors and methods to be used for odor control are presented in the following sections.

3.1 Potential Sources of Odors and TVOCs

Generally, the residuals encountered at former MGP sites are well defined. They are related to residual coal tar-like materials and petroleum, and principally contain VOCs, polycyclic aromatic hydrocarbons (PAHs), and several inorganic constituents, including metal-complexed cyanide compounds, and metals. While it is not likely in the utility relocation work area, constituents of MGP tar or petroleum products can produce odor emissions during investigation activities when they are unearthed during trenching/ excavation. When this occurs, VOCs and light-end semi-volatile organic compounds (SVOCs) can volatilize into the ambient air. Some MGP residuals can cause distinctive odors that are similar to mothballs, roofing tar, or asphalt driveway sealer. It is important to note that the CAMP will provide for continual monitoring of VOCs and particulates during the fieldwork to monitor for any potential release of constituents which may exceed the exposure limits for downwind receptors.

3.2 Monitoring Threshold Levels and Mitigation Control Measures

The air monitoring threshold levels and mitigation control measures for TVOCs and PM_{10} are presented in Table 2 below:

Table 2. Air Monitoring Threshold Levels and Mitigation Control Measures

TVOCs	
Threshold Level	**Mitigation Control Measures**
Alert >1 ppm at the wall of an occupied structure or at an air intake	• Check the indoor air concentration and compare with background measurements taken previously
Response >5 ppm above background for 15-minute average	• Temporarily halt work activities. • Continue monitoring, especially inside of occupied structures. • If VOC levels decrease (per instantaneous readings) below 5 ppm over background, work activities can resume.

TVOCs	
Threshold Level	**Mitigation Control Measures**
Action Persistent levels >5 ppm over background but <25 ppm	• Halt work activities. • Identify source of vapors. • Corrective action to abate emissions. • Continue monitoring. • Resume work activities if TVOC levels 200 feet downwind of the property boundary or half the distance to the nearest potential receptor is <5 ppm for a 15-minute average.
Stop-Work >25 ppm at the perimeter of the work area	• Shut down work

PM_{10}	
Threshold Level	**Mitigation Control Measures**
Response >100 µg/m^3 above background for 15-minute average or visual dust observed leaving the site	• Apply dust suppression. • Continue monitoring. • Continue work if downwind PM_{10} particulate levels are <150 µg/m^3 above upwind levels and no visual dust leaving site
Action >150 µg/m^3 above background for 15-minute average	• Stop work. • Re-evaluate activities. • Continue monitoring. • Continue work if downwind PM_{10} particulate levels are <150 µg/m^3 above upwind levels and no visual dust leaving site.

Sources:
- NYSDOH Community Air Monitoring Plan, as published in NYSDEC DER-10, Appendix 1A, 2010.
- Fugitive Dust and Particulate Monitoring, NYSDEC DER-10, Appendix 1B, 2010.
- Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures, NYSDOH.

3.3 General Site Controls

Excavation or procedure site controls that will be implemented include:

- The work zone for the utility relocation is located outside of the known area of contaminants. CAMP monitoring is being implemented in case unknown contaminates are released during excavation/trenching procedures.
- If impacted material is found every effort will be made to minimize the amount of time that impacted material is exposed to ambient air at the site.
- Excavated material from the installation of the electricity lines is to be tested, and in unlike but has potential to generate VOCs and odors. Every effort will be made to complete this work as quickly as possible and to keep these materials covered at all times.
- Meteorological conditions are also a factor in the generation and migration of odors. Some site activities may be limited to times when specific meteorological conditions prevail, such as when winds are blowing away from a specific receptor.

3.4 Secondary Site Controls

If substantial TVOCs or odors are found and still present an issue following implementation of the above procedures, secondary controls will be enacted. GEI personnel will work through the applicable list of secondary controls with National Grid and NYSDEC until the perimeter odor issues are resolved. Final selection of controls will be dependent on field conditions encountered. Secondary controls include the following:

- If impacted soil is found, temporary tarps or polyethylene covers will be used to control odors, VOCs, and dust.
- Water may be sprayed onto dry soils to minimize the generation of dust.
- The placement of portable barriers close to small active source areas can elevate the discharge point of emissions to facilitate dispersion and minimize the effect on downwind receptors. The barriers can be constructed using materials such as plastic "Jersey barriers", or fence poles and visual barrier fabric/plastic. The barriers are placed as temporary two or three-sided structures around active test pits or other intrusive investigation areas, oriented such that the barriers are placed on the upwind and downwind sides of the source. If only one side of the source can be accessed, then the barrier should be placed on the downwind side.
- Two agents that can be sprayed over impacted soil have been determined to be effective in controlling emissions. They include odor suppressant solution (BioSolve™), and hydro mulch. These agents may be used where tarps cannot be effectively deployed over the source material, or where tarps are ineffective in controlling odors:
  - BioSolve™ can provide immediate, localized control of odor emissions.
  - Hydromulch - Although it is unlikely that it will be necessary, modified hydromulch slurry may be used to cover inactive sources for extended periods of time (up to several days). The hydromulch, typically cellulose fibers (HydroSeal®), is modified by mixing a tackifier (glue) with the mulch and water to form a slurry. It is applied using a standard hydroseed applicator to a thickness of ¼-inch. The material forms a sticky, cohesive, and somewhat flexible cover. Reapplication may be necessary if the applied layer becomes desiccated or begins to crack.

3.5 Building Controls

Controls for minimizing the impacts to occupied buildings include temporary shut-down and/or closure of air intakes within the downwind zone, or deferral of work to times when building occupants are not present.

4. Documentation and Reporting

The attached Daily Field Report Form will be filled-out each day to record all the details of the CAMP work. The form will be used to record the following information:

- Date and weather, with significant changes noted which may affect the positioning of the meters or recording of the data.
- Calibration results for the instruments.
- Locations of the upwind and downwind monitoring stations, and any changes made to the locations during the day to adjust for changing work locations or wind directions.
- General Site observations such as daily construction activities, and documentation of any exceedances.

Additional information will be noted within the project field book(s), as necessary.

The electronic measurements from the PIDs and dust meters will be reviewed daily and archived. Exceedances of the Response and Action Levels, if any, and the actions to be taken to mitigate the situations, will be discussed immediately with the on-site representatives, or reported within one business day to the NYSDEC project manager (if on-site NYSDEC oversight is not provided). The results of the daily CAMP monitoring will also be discussed in the daily written report to the NYSDEC project manager. Summaries of all air monitoring data will be provided to the NYSDEC or the NYSDOH upon request.

CAMP odor monitoring results will be recorded in the field book and/or the Daily CAMP Field Report and will also be available for review by the state agencies.

Appendix A

Community Air Monitoring Daily Field Report Form

Data Collection Forms and Worksheets
Air Monitrong Plan Name
Canastota Non-Owned Former MGP
Canasota, NY

Daily Field Report

System Operations		**General Observations**	
Sampling Date		General Weather Conditions	
System Start Time			
System Stop Time		General Description of Site Activities:	
Total Hours Monitored			
System Calibrations			
(Time/Status)			

System Alarm Log

Time	Alarm Level (P, V)	Station No.	Alarm (Dust, VOC)	Location (UW, CW, DW)	Dust/TVOC/Odor 15-min. avg.	Dust/TVOC/Odor 15-min avg conc. range	Total # of Alarms	[TVOC] Instant.	GC Exceed?	GC compounds(s)	Site Person/Time Notified

Notes:

	Particulate (15-min)	TVOC (15-min)	Odor (15-min)
Alert Limit:			
Response Limit:			
Action Limit:			

Notes:

SC - Site Condiution
UW - Upwind
CW - Crosswind
DW - Downwind

P - Particulate/ Dust
Particulate recorded in ug/m^3
V - Total VOC
Total VOC measured in ppm

B - Benzene
T - Toluene
E - m,p-XyleneEthylbenzene
X - o-Xylene

Field Representative:
Date: _____

Page 1 of __1__

Appendix B Health and Safety Plan 2024

GEI Safety
EVERYONE LIVE SAFE EVERYDAY

GEI Consultants

Consulting
Engineers and
Scientists

Health and Safety Plan

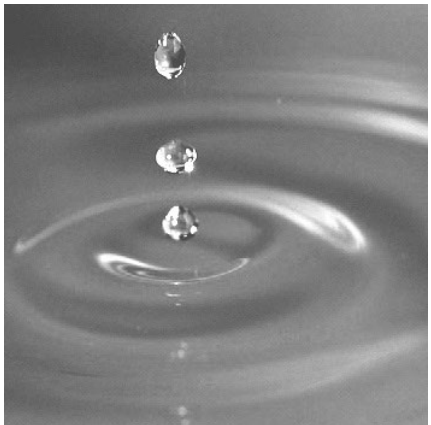
Canastota Non-Owned Former MGP
Canastota, New York

Prepared for:
National Grid
300 Erie Boulevard West
Syracuse, NY 13202

Prepared by:
GEI Consultants, Inc.
1301 Trumansburg Rd, Suite N
Ithaca, NY 14850
607-216-8955

August 2024

Project No. 034390



Daniel Kopcow, P.E.
Project Manager

Jessie Papageorge
Regional Safety Manager

Table of Contents

1. Emergency Contact Information 1

2. GEI Safety Practices to Live By 2

3. Site Background 3
3.1 Site Description 3
3.2 Scope of Field Work 4

4. Potential Hazards 5
4.1 General Site Hazards 5
4.1.1 Hazard Controls 9
4.1.2 Personal Safety 9
4.1.3 Vehicle Safety 10
4.1.4 Communicable Diseases 10
4.2 Job Hazard Analysis 11
4.3 Heat and Cold Stress 12
4.3.1 Heat Stress 12
4.3.2 Cold Stress 12
4.4 Constituents of Concern 12
4.4.1 Site-Specific COC 13
4.4.2 Chemicals Brought on Site 17

5. Personal Protective Equipment 18
5.1 Respiratory PPE 18

6. Responsibilities and Lines of Authority 19
6.1 GEI Personnel Responsibilities 19
6.1.1 GEI Safety Director 19
6.1.2 GEI Project Manager 19
6.1.3 GEI Regional Safety Manager 19
6.1.4 GEI Site Safety Manager 20
6.1.5 All GEI Field Personnel 20
6.2 Lines of Authority 20
6.2.1 Stop Work Authority 21
6.3 Subcontractors 21

7. Training Requirements 22
7.1 On-Site Safety Briefings 22

8. Medical Surveillance Program 23

9. Personal/Work Zone Air Monitoring 24
9.1 Calibration 24
9.2 Action Levels 24
9.2.1 VOC Monitoring and Control 25
9.2.2 Dust Monitoring and Control 26

10. Site Control 27
10.1 Site Zones 27
10.2 Buddy System 27
10.3 Sanitation for Temporary Work Sites 27
10.4 Illumination 27
10.5 Smoking 27
10.6 Alcohol and Drug Abuse Prevention 28

11. Incident Reporting 29
11.1 Injury Triage Service 30
11.2 Flow Chart for Accident Reporting 31

12. Decontamination Procedures 32
12.1 Personnel and PPE Decontamination 32
12.2 Equipment Decontamination 32

13. Emergency Response 33
13.1 Evacuation 33
13.2 Fire 33
13.3 Spills or Material Release 33
13.4 Medical Support 34
13.5 Severe Weather 34
13.6 Hazard Communication Plan 34

14. Health and Safety Plan Sign-Off 35

Tables
1. Emergency Contact Information
2. GEI Employee Site Tasks and Descriptions
3. General Site Hazards
4. Primary Constituents of Concern Data

Figure
1. Site Location and Muster Point

Appendices
A. Map to Hospital and Occupational Health Clinic
B. Job Hazard Analyses
C. Safety Data Sheets

D. Forms
E. GEI Health and Safety SOPs and Programs
F. National Grid, Safety Procedure – COVID-19 Health & Safety Plan (A-116)
G. National Grid, Contractor Safety Requirements

1. Emergency Contact Information

Table 1. Emergency Contact Information

Site Information	
Project Name:	Canastota Non-Owned Former MGP
Project Address:	424 Canal Street, Canastota, NY, 13032
Project Number:	034390
Important Phone Numbers	
Emergency (Police/Fire/Medical):	911
Local Police:	315-697-8888
Fire Department:	315-697-3341
Hospital and Occupational Clinic Information *(See Attached Map and Directions in Appendix A)*	
Oneida Health Hospital: 321 Genesee St Oneida, NY 13421	315-363-6000
Urgent Care/Occupational Health Clinic: Contact Medcor Triage	Call Medcor Triage 1-800-775-5866
Contacts	
Project Manager: Dan Kopcow, P.E.	(607) 216-8976 office (607) 206-9075 cell
Safety Director: Steve Hawkins	(860) 368-5348 office (860) 916-4167 cell
Regional Safety Manager: Jessie Papageorge	(973) 873-7117 office (862) 432-2283 cell
Site Safety Manager: Steve Stucker	(315) 247-6490 cell
Medcor Triage	1-800-775-5866
Client Contact: Steve Stucker	(315) 428-5652 office (315) 247-6490 cell
Other Information	
Contractor Requesting/Performing Utility Clearance: TBD	Utility Clearance Ticket Number: TBD

2. GEI Safety Practices to Live By

Safety is what we do and how we do it every day. These Everyday Practices to Live Safe are simple yet concise reminders to our employees, clients, contractors, visitors of the steps that must be taken to avoid injury, illness, and incident so everyone can live safe every day. To maintain a safe work environment, GEI has established an organizational structure and a Corporate Health and Safety Program along with these safety practices.

1. Stop work if it is unsafe to continue, after any incident, injury, or near miss.

2. Prepare before starting work. Complete safety training and project-related safety requirements, such as preparation and review Health and Safety Plans (HASPs) as required by project or job-related duties.

3. Assess and control safety hazards/risks before starting any tasks and when previously unidentified safety hazards are observed.

4. Be attentive and aware of your environment. Constant focus and awareness will avoid complacency.

5. Properly use and maintain GEI-approved and required PPE in all appropriate circumstances.

6. Do not work or drive impaired, including under the influence of alcohol/drugs or while fatigued.

7. Follow all safety practices when operating a vehicle. Always wear your seatbelt while in any vehicle. Do not drive distracted, including using hand-held cell phones, when operating any vehicle.

8. Use tools, equipment, and safety devices in accordance with manufacturers recommendations and GEI expectations. Never modify or override safety devices.

9. When activities involve chemicals or hazardous substances, follow GEI's hazard communication requirements, including labeling, reviewing Safety Data Sheets (SDS), and keeping proper protections in place.

10. Be aware of and keep clear of equipment moving in all work areas, at all times.

11. Follow GEI's incident reporting procedure in the event of safety incidents, including injuries, illness, near misses, or observation of unsafe behaviors.

3. Site Background

This Health and Safety Plan (HASP) establishes policies and procedures to protect GEI Consultants, Inc. (GEI) personnel from the potential hazards posed by the activities at the Canastota Non-Owned Former Manufactured Gas Plant (MGP) property (site) in Canastota, NY (Figure 1). Reading, understanding, and compliance with the contents of the HASP is required for on-site GEI personnel and will be reviewed by GEI subcontractors. Subcontractors will prepare their own site-specific HASP but may use this HASP as a guide. This HASP identifies measures to minimize accidents and injuries which may result from site conditions or activities. A copy of this HASP will be maintained on site for the duration of the work.

Employees should review National Grid's Safety Procedure, Contractor Safety Requirements for reference (Appendix G). This document represents policies and safety-related work methods unique to National Grid and they may be more stringent than the Occupational Safety and Health administration (OSHA) regulations. Contractors must follow these requirements as well as their own rules or regulations that meet or exceed OSHA and other regulatory requirements.

3.1 Site Description

The site is located at East North Canal Street, on the east side of the Village of Canastota and immediately across the street from the old Erie Canal. The location of the former MGP is at the southern end of a property approximately 10 acres in area. It is owned by the Village of Canastota and is in active use as the Department of Public Works (DPW) garage and service yard. The site is bounded by East North Canal Street to the south, Roberts Street to the north, the Greater Lenox Ambulance Service and residential properties to the west, and residential properties to the east.

The former MGP property was a manufacturer of coal gas, operating from 1907 until approximately 1926. Gas was produced by both the Lowe (water gas) process and coal process. Environmental investigations performed from 2003 – 2014 have found coal tar and petroleum products present in subsurface soils and groundwater at the site. The contaminants of concern include volatile organic chemicals (VOCs) such as benzene, toluene, ethyl benzene, and xylenes (BTEX), semi-volatile organic compounds (SVOCs) such as polycyclic aromatic hydrocarbons (PAHs), Polychlorinated biphenyls (PCBs), and heavy metals. Coal tar non-aqueous phase liquid (NAPL) was also observed in the subsurface soil.

Field work will consist of working in areas outside of, but adjacent to the contaminated areas.

3.2 Scope of Field Work

For the purpose of preparing for environmental remediation construction at the Site, relocation of a sanitary sewer force main and electric lines will take place.

The sanitary sewer force main work will include trench excavation and backfill, bedding, and pipe installation. The electric line work will include the installation of a new utility pole, pole-mounted transformers, and overhead electric line. Subsurface activities for the electric line work will include trench excavation and backfill, bedding, and conduit installation. These activities will be overseen by GEI.

Soil sampling and drum staging/handling will be performed by GEI in the event of impacts being encountered during this work, although they are not expected to be encountered.

The tasks utilized for this work are site mobilization, excavation and construction oversight, trench soil sampling, and drum handling/staging.

Table 2. GEI Employee Site Tasks and Descriptions

Task Number	Task Titles	Task Descriptions
1.	Driving – Site Mobilization	Mobilize GEI personnel and equipment to and from the project site.
4.	Excavation/Construction Oversight	Oversee the excavation of soil for the installation of electrical and sewage lines.
5.	Soil Sampling - Trench	Soil sampling on an as-needed basis, only if impacts are encountered.
6.	Drum Handling/Staging	Moving and staging drums on an as-needed basis, only if impacts are encountered.

Notes:
Task Titles correlate to a prepared site-specific JHAs.
Task Descriptions are a brief summary of the task being performed by GEI.

4. Potential Hazards

The potential hazards associated with site conditions and activity hazards related to GEI on-site activities have been identified in this section. Detailed information for these hazards and their control methods are discussed further in the Table 3 and the job hazard analysis (JHAs) included in Appendix B.

4.1 General Site Hazards

General hazards and control measures that are applicable to all site activities have been identified in Table 3.

Table 3. General Site Hazards

General Hazards These Hazards Apply to All Site Activities	Control Measure
Driving	• Employees must wear their safety belt while in a moving vehicle. • Vehicle accidents will be reported in accordance with GEI's accident reporting procedures. • Vehicles will be properly maintained and safely operated (refer to GEI's Fleet Maintenance Program) • Employees will follow safe driving behaviors, which include limiting distractions such as manipulating radios or other equipment that may cause a distraction. Employees will not exceed the posted speed limit and will maintain a safe distance between other vehicles. • Use defensive driving techniques. • Driving distance and time after a 12-hour shift will not exceed 30 miles or 30 minutes (whichever is greater). • See SOP HS-004
Utilities- Shock, electrocution, fire, explosion	• An underground utility survey must be conducted prior to intrusive activities. Coordination with utility locating services, property owner(s) or utility companies must be conducted. • Utilities are to be considered live or active until documented otherwise. • For overhead utilities within 50 feet, determine with the utility company the appropriate distance. Minimum distance for clearance is based on voltage of the line. • If exposing a utility, proper support and protection must be provided so that the utility will not be damaged. • If a gas line is contacted, the contractor must notify police, fire, and emergency personnel, and evacuate employees according to the site evacuation procedures. No attempt will be made to tamper with or correct the damaged utility. • See SOP HS-014

General Hazards These Hazards Apply to All Site Activities	Control Measure
Vehicular Traffic – Struck by injury, crushing	• Do not turn your back on traffic • Use situational awareness to identify concerns like erratic motorist movements, sudden stops, squealing tires, or other indicators that motorists are having difficulty in maneuvering through the work zone. If observed notify the workers and suspend work until safe restart work. • Have a bail-out plan in case of an errant vehicle. Warn other workers of errant vehicles. Increase visibility of the work area to others by using cones, flags, barricades, proper lighting, and caution tape to define work area. • Use a "spotter" to locate oncoming vehicles. • Use vehicle to block work area. • Engage police detail for all work conducted in appropriate areas. • Wear high-visibility, reflective vest at all times. • Maintain minimum DOT defined distances to other traffic lanes. • See SOP HS-016
Heavy Equipment – Working Near Struck-by, caught-in-between equipment, crushing, pinch points	• Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or (electrical hazard) EH-rated safety boots with composite toe and shank; safety glasses; nitrile/neoprene gloves; and earplugs. • Identify yourself and your work location to heavy equipment operators, so they may incorporate you into their operations. • Coordinate hand signals with operators. • Stay Alert! Pay attention to equipment backup alarms and swing radis. • Wear a high-visibility, reflective vest when working near equipment or motor vehicle traffic. • Position yourself in a safe location when filling out logs or talking with the contractor. • Notify the contractor immediately if any problems arise. • Do not stand or sit under suspended loads or near any pressurized equipment lines. • Do not operate cellular telephones in the vicinity of heavy equipment operation. • See SOP HS-01
Cell Phone Use - On Project Site	• Look and listen for potential hazards while using a cell phone for work related activities. • Limit your cell phone use for personal calls or other activities to non-working hours in areas free of hazards. • Do not use your cell phone when safety hazards are present. • Do not use headphones or ear buds while performing work related activities. Headphone or ear bud use can prevent you from hearing hazards around you. • Noise canceling headphones or earbuds are not to be used in place of hearing protection. • Never use a cell phone while operating any equipment or vehicle. • Consider using the "do not disturb" or "silent" functions to allow you to focus on your task.

General Hazards These Hazards Apply to All Site Activities	Control Measure
Cold Stress – Hypothermia, Frostbite	• Take breaks in heated shelters when working in extremely cold temperatures. · Drink warm liquids to reduce the susceptibility to cold stress. • Wear protective clothing (recommended three layers: an outside layer to break the wind, a middle layer to provide insulation, and an inner layer of cotton of synthetic weave to allow ventilation). • Wear a hat and insulated boots. • Keep a change of dry clothing available in case clothes become wet. • Do heavy work during the warmer parts of the day and take breaks from the cold. • If possible, shield work areas from drafts of wind and use insulating material on equipment handles when temperatures are below 30°F • Watch for symptoms of cold stress and initiate first aid procedures (Section 4.3.2).
Heat stress – Fainting, Fatigue, Heat Stroke	• Increase water intake while working. · Increase number of rest breaks and/or rotate workers in shorter work shifts. • Rest in cool, dry areas. • Watch for signs and symptoms of heat exhaustion and fatigue. • Plan work for early morning or evening during hot months. • Use ice vests when necessary. • Watch for symptoms of heat stress and initiate first aid procedures (Section 4.3.1).
Inclement Weather	• Listen to local forecasts for warnings about specific weather hazards such as tornados, thunderstorms, and flash floods. • If storms produce thunder and/or lightning, leave the work area immediately and move to a safe area. • Discuss an action plan prior to the severe weather. • Wear appropriate PPE for the type of weather that could be encountered. • Stop work until conditions are suitable. Take cover in vehicles or shelter as appropriate. • See SOP HS-01
Insects – Bites, Stings, Allergic Reaction	• Apply insect repellent prior to performing field work and as often as needed throughout the work shift. • Wear proper protective clothing (work boots, socks, and light-colored clothing). • Wear shoes, long pants with bottoms tucked into boots or socks, and a long-sleeved shirt when outdoors for extended periods of time, or when many insects are most active (between dawn and dusk). • When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible. • Field personnel who may have insect allergies will have allergy medication on site and will provide this information to the SSM prior to commencing work. • Field personnel will perform a self-check at the end of the day for ticks. • See SOP HS-001

General Hazards These Hazards Apply to All Site Activities	Control Measure
Physical Injury – Slips, Trips and Falls	• Wear PPE that properly fits, is in good condition, and is appropriate for the activities and hazards. • Maintain good visibility of the work area. · Avoid walking on uneven, steeply sloped, or debris ridden ground surfaces. • Plan tasks prior to preforming them including an activity hazard analysis. • Keep trafficked areas free from slip/trip/fall hazards. • Maintain weed growth in sampling areas, especially on slopes. • Wear shoes with traction. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to work areas, on steeply sloped areas, or where steep areas must be traversed.
Poisonous Plants - Poison Ivy, Poison Oak, and Poison Sumac	• Avoid areas infested with poisonous plants. • Use a barrier cream to provide some protection. • Wash exposed clothing separately in hot water with detergent. • After use, clean tools, and soles of boots with rubbing alcohol or soap and lots of water. • Immediately wash with soap and water any areas that come into contact with poisonous plants. • If exposed to a poisonous plant, wash with soap and water or a product such as Technu. First aid kits are available in the company vehicles. • See SOP HS-001
Repetitive Motion Injury - Standing, Squatting, and Bending Over	• Take regular breaks and do not work in unusual positions for extended periods of time. • Walk and stretch between tasks. • See SOP HS-025
Sun Exposure	• Liberally apply sunscreen, with a minimum broad-spectrum sun protection factor (SPF) of 30 • Wear safety glasses that offer protection from ultraviolet A and B (UVA/UVB) rays. • Bring shade to the site to reduce exposure. • When possible, wear long-sleeved shirts and long pants. • Clothes made from tightly woven fabric and darker colors offer the best protection. Some clothing is certified as offering UV protection. • Wear a hat that has a brim all the way around that shades your face, ears, and the back of your neck. A tightly woven fabric, such as canvas, works best to protect your skin from UV rays. • Sunscreen wears off. Put it on again if you stay out in the sun for more than 2 hours. • Check the sunscreen's expiration date. Sunscreen without an expiration date has a shelf life of no more than 3 years.
Coronavirus-COVID-19	• Do not go to work if you are sick. • Maintain distance from others when possible. • Frequent washing of hands with soap and warm water for 20 seconds. If soap is not available, use hand sanitizer with 60% alcohol. • Wipe down high contact surfaces with disinfectant routinely before and after use.

4.1.1 Hazard Controls

On-site safety equipment to control the hazards listed above will include:

Site-Specific Safety Equipment *(check all that apply)*		
☒ Drinking water/electrolyte fluids	☒ Hand cleaner/sanitizer	☐ Tick removal kit
☒ Eye wash bottles	☒ Insect repellent	☐ Other:
☒ Fire extinguisher	☒ Phone charger	☐ Other:
☒ First aid kit	☒ Poison ivy/oak cleanser	☐ Other:
☐ Flashlight/head lamp	☒ Sunscreen	

Personal protective equipment (PPE) is discussed in further detail in Section 5.

4.1.2 Personal Safety

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

- www.cityrating.com/crimestatistics.asp

Canastota Village crime statistics report an overall downward trend, with an increase in violent crime and property crime decreasing. The crime rate in Canastota Village for 2023 is expected to be lower than in 2019. The violent crime rate for Canastota Village in 2019 was 59% lower than the national violent crime rate and the city property crime rate was 65% lower than the national average.

Employees must not knowingly enter into a situation where there is the potential for physical and violent behaviors to occur. If employees encounter hostile individuals or a confrontation develops in the work area, suspend work activities, immediately leave the area of concern, and contact local 911 for assistance. Notify the Site Safety Manager (SSM) and Safety Team (Safety Director and Regional Safety Managers – Safety_Team@geiconsultants.com)of any incidents once you are out of potential danger.

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

4.1.3 Vehicle Safety

Mobilization to and from the field will likely require the use of a personal, GEI fleet, or rental vehicle. When operating a vehicle while conducting business on behalf of GEI, employees must follow safe driving practices as outlined in the GEI Safe Driving SOP.

In conjunction with the hazard controls listed in the Site Mobilization JHA, GEI employees should follow these guidelines to operate a vehicle safely:

- Do not drive distracted, including using hand-held cell phones, when operating any vehicle.
- Complete a 360° inspection of the vehicle and surrounding area to identify vehicle safety issues and hazards that could be within the travel path.
- Confirm cell phones, tablets, or other potentially distracting equipment are safely secured and put away prior to operating the vehicle.
- Park in designated areas or a safe area away from heavy equipment.
- When parking a vehicle at a job site, the employee should make an effort to position the vehicle in a manner which reduces or eliminates the need to operate the vehicle in reverse.
- Use a spotter whenever possible.

GEI personnel will follow the GEI Incident Reporting (and client specific reporting) procedures if a vehicle accident occurs involving another vehicle, results in injury, or the damage to property.

4.1.4 Communicable Diseases

Communicable diseases are illnesses caused by viruses or bacteria that people spread to one another through contact with contaminated surfaces, bodily fluids, blood products, insect bites, or through the air. Examples of communicable diseases include influenza, coronavirus 2019, hepatitis B, salmonella, measles, and blood-borne illnesses. Most common forms of spread include food, insect bites, droplets, or skin contact. Infections may range in severity from asymptomatic (without symptoms) to severe and fatal. Transmission of these biologic agents can occur in a variety of ways including airborne (inhalation), direct physical contact with an infectious person, consuming contaminated foods or beverages, contact with contaminated body fluids, contact with contaminated inanimate objects, or being bitten by an infected insect or tick. Below are ways to prevent the infection or spread of communicable diseases:

1. Distancing - Maintain distance from others when possible. Minimize the number of employees in one location to the extent possible.

2. Wash Hands Often - Frequent hand washing with soap and warm water for 20 seconds. If soap and water are not readily available, use hand sanitizer (containing 60% alcohol) until soap and water can be used.
3. Clean and Disinfect Commonly Used Surfaces - Wipe down surfaces with disinfectant on a routine basis. This includes field equipment and other items that may have previously been used by others. This is especially important while working in construction trailers. When using company and personal vehicles, wipe surfaces including the steering wheel, gear shifter, controls, and door handles before and after use.
4. Use Good Hygiene Practices – These include washing hands frequently, avoid touching your eyes, nose, and mouth, and cover coughs and sneezes.
5. Get Vaccinated - Vaccines can prevent many infectious diseases. There are also vaccines that are recommended or required for travel to certain parts of the world.
6. Avoid Touching Wild Animals - Be cautious around wild animals as they can spread infectious diseases.
7. Stay home when you are sick.

Appendix G includes National Grid's COVID-19 Health and Safety Plan. This guidance document, COVID-19 Health and Safety Plan, describes pandemic response measures, taken by National Grid, to help prevent the spread of COVID-19.

4.2 Job Hazard Analysis

The site-specific tasks, potential hazards, and control measures established to reduce the risk of injury or illness are identified in step-by-step JHAs included in Appendix B. Prior to the start of work, project team members will determine what tasks are covered in the scope of work (Table 2) and then develop a JHA for each of these tasks and have them reviewed by the Project Manager (PM) or their designee and approved by a member of the Safety Team. Indicated in each JHA are the specific PPE, training, equipment, health and safety SOPs and programs that apply to each task. Additional information on hazard controls can be found in GEI's SOPs and programs that apply to this project which are indicated in Appendix E.

4.3 Heat and Cold Stress

4.3.1 Heat Stress

Employees may be exposed to the hazards associated with heat stress when ambient temperatures exceed 80ºF. To prevent heat-related illness, Project Managers (PMs) should plan for proper hydration (drinking plenty of water), acclimatization (getting used to weather conditions), and schedules that alternate work with rest. Employees should also be trained to recognize the symptoms of heat related illnesses and know how to administer first aid for heat-related illnesses and activate emergency medical services quickly when needed. Water and shade will be available to all project employees and located as close as practicable to the work areas when temperatures exceed 80°F.

CDC Heat Planning Tool
For the most recent details and tools for heat stress, use your smart phone to access the Centers for Disease Control for the latest information. Additional details can be found in GEI's Heat Stress Program located on the Safety Resources page of GEI Connections.

Prior to each workday, the forecasted temperature and humidity for the worksite will be reviewed and will be compared against the National Weather Service Heat Index to evaluate the risk level for heat illness. When the temperature equals or exceeds 95°F, or during a heat wave, high heat procedures will be used which include additional preventive measures including pre-shift meetings to encourage employees to drink plenty of water, working in the buddy system or regular communication so observations can be made for heat related illness, and to remind employees of their right to take a cool-down rest when necessary.

4.3.2 Cold Stress

Employees may be exposed to the hazards associated with cold stress when working in cold, wet, and/or windy conditions. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia, as well as slippery surfaces, brittle equipment, and poor judgment.

CDC Cold Stress Info
For the most recent details and tools for cold stress, use your smart phone to access the Centers for Disease Control for the latest information. Additional details can be found in GEI's Cold Stress Program located on the Safety Resources page of GEI Connections.

4.4 Constituents of Concern

The characteristics of constituents of concern (COC) at the site are discussed below for safety information purposes. A COC is any substance classified or defined as hazardous, extremely hazardous, toxic, or dangerous. The COC included in this health and safety plan will be the primary constituents that have been detected, are anticipated to be detected, or are being evaluated for the presence of, on the project site. These COC will be used to determine the action levels and PPE necessary for site personnel. Adherence to the safety and health

guidelines in this HASP should reduce the potential for exposure to the COC discussed below.

4.4.1 Site-Specific COC

Coal Tar and Coal Tar Products

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

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

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

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

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs), are a group of chemicals consisting of numerous carbon atoms joined together to form multiple rings. Most are formed from the incomplete combustion of plant or animal matter, or carbon fuels, such as coal or petroleum. These compounds not expected to be at concentrations that exposure symptoms would occur. PAHs may cause contact dermatitis. Direct contact can be irritating to the skin and produce itching, burning, swelling, and redness. Direct contact or exposure to the vapors may be irritating to the eyes. Conjunctivitis may result from prolonged exposure. High levels of exposure to PAHs, though not anticipated during work activities conducted during this project, may increase the risk of cancer including lung, kidney, and skin cancer. Naphthalene is also an eye and skin irritant and can cause nausea, headache, fever, anemia, liver damage,

vomiting, convulsions, and coma. Poisoning may occur by ingestion of large doses, inhalation, or skin absorption.

The primary routes of exposure for PAHs are inhalation and dermal contact. Therefore, particulate monitoring, gloves, and respiratory protection are primary controls against exposure to PAHs.

Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) have historically been used from a number of sources including, but not limited to; manufactured gas plant (MGP) operations, electrical systems, hydraulic oils, lubricants, cutting oils, printer's ink, and asphalt. The manufacturing of PCBs was stopped in the 1970s due to the harmful effects to health and the environment. Exposure to PCBs can occur through unbroken skin without immediate pain or irritation. PCBs detected at the site are at environmental concentrations and are not expected to be at concentrations that exposure symptoms would occur. Acute effects of exposure to high concentrations of PCB can include eye, skin, nose, and throat irritation. Chronic effects of PCB exposure can include skin swelling and redness, gastro-intestinal disturbances, and neurological effects such as headache, dizziness, nervousness, and numbness of extremities. PCBs are suspected human carcinogens that can cause liver cancer. PCBs can accumulate in fatty tissues and result in health effects after the initial exposure has occurred. Due to the impactful health/environmental effects of PCBs, the government highly regulates PCB contamination.

The primary routes of exposure for PCBs are inhalation, dermal contact, and ingestion. Therefore, particulate monitoring, gloves, and respiratory protection are the primary controls against exposure to PCBs, however, site-specific controls are required when encountering high levels of PCBs.

Semi-Volatile Organic Compounds

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

SVOCs are not expected to be present at concentrations that exposure symptoms would occur. SVOCs such as those listed above may cause contact dermatitis. Direct contact can be irritating to the skin and produce itching, burning, swelling, and redness. Direct contact or exposure to the vapors may be irritating to the eyes. Conjunctivitis may result from prolonged exposure. Many SVOCs are considered to be very toxic, if ingested. High levels of exposure to SVOCs, though not anticipated during work activities conducted during this project, may increase the risk of cancer including lung, kidney, and skin cancer. Naphthalene

is also an eye and skin irritant and can cause nausea, headache, fever, anemia, liver damage, vomiting, convulsions, and coma. Poisoning may occur by ingestion of large doses, inhalation, or skin absorption.

The primary routes of exposure to SVOCs are through inhalation and direct contact, therefore air monitoring, gloves, and respiratory protection are primary controls against exposure to SVOCs.

Volatile Organic Compounds

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

Table 4. Primary Constituents of Concern Data

Constituent	Exposure Limit(s)	Route of Exposure	Primary Hazard/ Symptoms of Exposure
(Link to COC Data Table Examples) If a COC for your site is not included in this table, use The CDC NIOSH Guide			
Arsenic	0.01 mg/m^3 A.L. 0.005mg/m^3	Inhalation, skin absorption, ingestion, skin contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, potential carcinogen
Benzene	1 ppm TWA 5 ppm STEL	Inhalation, skin absorption, ingestion skin contact	Irritation of eyes, skin, nose, respiratory system, giddiness, headache, nausea; staggering gait, fatigue, anorexia, weakness, dermatitis, bone marrow depression, potential carcinogen
Coal tar pitch volatiles	TWA 0.2 mg/m^3	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]
Ethylbenzene	100 ppm	Inhalation, ingestion, skin contact	Eye, skin, mucous membrane irritation; headache; dermatitis, narcosis; coma
Hydrogen cyanide	10 ppm (11 mg/m^3) [skin]	Inhalation, ingestion, absorption, skin/eye contact	Asphyxia; weakness, headache, confusion; nausea, vomiting; increased rate and depth of respiration or respiration slow and gasping; thyroid, blood changes

Constituent	Exposure Limit(s)	Route of Exposure	Primary Hazard/ Symptoms of Exposure
(Link to COC Data Table Examples) If a COC for your site is not included in this table, use The CDC NIOSH Guide			
Iron	Iron oxide dust and fume: 10 mg/m^3	Inhalation, ingestion, eye contact	Respiratory tract irritation, coughing, shortness of breath, overdose of iron may cause vomiting, abdominal pain, bloody diarrhea, vomiting blood, lethargy, and shock; acidity in the blood, bluish skin discoloration, fever, liver damage, and possibly death; eye and cornea irritation and discoloration
Lead	0.05 mg/m^3 A.L. 0.03 mg/m^3	Inhalation, ingestion, skin contact	Weakness, insomnia; facial pallor; pal eye, anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis of wrist and ankles; irritates eyes, hypo tension
Naphthalene	10 ppm (50 mg/m^3) TWA	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage
Nickel	TWA 1 mg/m^3 [*Note: The PEL does not apply to Nickel carbonyl.]	Inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]
PCBs (polychlorinated biphenyls)	0.5 mg/m^3 (Skin)	Inhalation, skin absorption, ingestion, skin contact	Irritate eyes; chloracne; liver damage
Polycyclic Aromatic Hydrocarbons (PAHs)	5 mg/ m^3 PEL TWA 0.2 mg/m3 [air]	Inhalation, ingestion, Skin and/or eye contact	Potential symptoms when exposed for long periods of time by breathing or skin contact can develop cancer.
Toluene	200 ppm	Inhalation, skin absorption, ingestion, skin contact	Eye, nose irritation; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, tearing of eyes; nervousness, muscle fatigue, insomnia, tingling in limbs; dermatitis

Constituent	Exposure Limit(s)	Route of Exposure	Primary Hazard/ Symptoms of Exposure
(Link to COC Data Table Examples) If a COC for your site is not included in this table, use The CDC NIOSH Guide			
Xylene	100 ppm	Inhalation, skin absorption, ingestion, skin contact	Eye, skin, nose, throat irritation; dizziness, excitement, drowsiness; incoordination, staggering gait; corneal damage; appetite loss, nausea, vomiting, abdominal pain; dermatitis
Zinc	TWA 15 mg/m^3 (total dust) TWA 5 mg/m3 (resp dust)	Inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function

Notes:
A.L. - Action Level
C - ceiling limit, not to be exceeded
Ca – carcinogen
f/cc - fibers per cubic centimeter
mg/m^3 - micrograms per cubic meter
mppcf - millions of particulates per cubic foot of air
ppm - parts per million
STEL - Short-term exposure limit (15 minutes)
TWA - Time-weighted average (8 hours)

4.4.2 Chemicals Brought on Site

Potential hazards associated with chemicals brought on site (e.g., decontamination chemicals, sample preservatives, fuels, calibration fluids) for the work will be mitigated through training, administrative controls (e.g., proper labeling and storage), and proper use of PPE. Safety data sheets (SDSs) for all chemicals brought on site shall be maintained by the SSM and are included in Appendix C.

5. Personal Protective Equipment

The PPE required to be worn on the project site is listed in the table below. Additional PPE required for the tasks to be performed is listed on the JHAs in Appendix B.

Site Required PPE *(check all that apply)*		
☒ Hard Hat	☐ Respirator	☐ Tyvek clothing/boots
☒ Safety Glasses	☐ Flame Resistant Clothing	☒ Hearing Protection
☒ Safety Boots	☐ Personal Flotation Device	☐ Long Sleeve Shirt
☒ Gloves (task specific)	☐ Snake Chaps	☐ Other:
☒ High Visibility Safety Vest	☐ EH-Rated Boots	☐ Other:

If site conditions suggest the existence of a situation more hazardous than anticipated, the site personnel will evacuate the area to a safe distance. The hazard, the level of precautions, and the PPE will then be reevaluated with the assistance and approval of the Safety Director and the PM. If conditions indicating the need for Level A or Level B PPE are encountered, personnel will leave the site and notify the PM or a member of the Safety Team. GEI's PPE Program can be found on the Safety Resources page of GEI Connections.

5.1 Respiratory PPE

GEI personnel who have the potential to don a respirator must have a valid fit test certification and medical clearance. Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.134). Air purifying respirators cannot be worn under the following conditions:

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

Upgrades to respiratory protection may be required based on the designated Action Levels found in Section 9.

6. Responsibilities and Lines of Authority

6.1 GEI Personnel Responsibilities

The implementation of health and safety at this project location will be the shared responsibility of the Safety Director, Regional Safety Director, PM, the Site Safety Manager (SSM), and each GEI personnel implementing the proposed scope of work.

6.1.1 GEI Safety Director

The Safety Director is responsible for the overall management of GEI's safety programs, policies, and procedures. Modifications to this HASP which may result in the reduction in the identification, evaluation, and control of safety and health hazards cannot be undertaken by the project team without the approval of the Safety Director.

6.1.2 GEI Project Manager

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

- Conducting and documenting the Project Safety Briefing.
- Verifying that the GEI staff and subcontractors selected to work on this program are sufficiently trained for site activities and have reviewed this HASP.
- Maintaining regular communications with the SSM and, if necessary, the Safety Director.

6.1.3 GEI Regional Safety Manager

The RSM is responsible for supporting the safety needs and requirements specified in this HASP. The RSM's specific responsibilities include:

- Reviewing and approving the HASP and applicable JHAs.
- Working with the PM and SSM to meet client safety requirements.
- Providing approval for fall protection plans and confined space entries (permit numbers), as applicable.
- Providing safety support regarding safety programs and procedures as applicable to the project.

6.1.4 GEI Site Safety Manager

The SSM is responsible for implementing and enforcing the safety requirements specified in this HASP and will be on-site during activities covered in the HASP. The SSM's specific responsibilities include:

- Enforcing the requirements of this HASP and notify the PM of noncompliance.
- Conduct daily Safety Tailgate meetings for site-related work.
- Maintaining a high level of health and safety consciousness among employees implementing the proposed activities.
- Procuring the air monitoring instrumentation, PPE, and safety equipment needed for GEI project employees and verifying that each is in good working order.
- Verifying that GEI subcontractors are utilizing the correct PPE and safety equipment.

6.1.5 All GEI Field Personnel

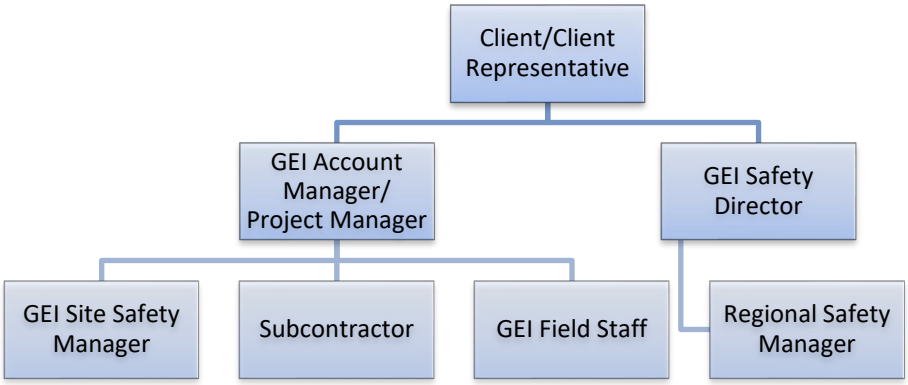
All GEI field personnel (including the PM and SSM) covered by this HASP are responsible for following the health and safety procedures in this HASP and for performing their work in a safe and responsible manner. The specific responsibilities that apply to all field personnel include:

- Reading and signing the HASP prior to the start of on-site work.
- Bringing forth any questions or concerns regarding the content of the HASP to the PM or the SSM.
- Attending and actively participating in the required Project Safety Briefing prior to beginning on-site work and any subsequent safety meetings.
- Complying with the requirements of this HASP and the requests of the SSM.
- Stopping work in the event that an immediate danger situation is perceived.
- Reporting accidents, injuries, and illnesses, regardless of their severity by following GEI's incident reporting procedures.

6.2 Lines of Authority

GEI will have responsibility for safety of its employees during the work performed at the site. GEI's SSM will have a cell phone available to contact the appropriate local authorities, in the event of an emergency. GEI's SSM will be available for communication with the GEI PM and with the National Grid's representative.

Project Lines of Authority



6.2.1 Stop Work Authority

GEI employees have the authority to stop work activities if an unanticipated hazard is encountered or a potential unsafe condition is observed. The GEI employee should contact the Safety Director and the Project Manager to discuss the stop work conditions and potential control methods that can be implemented.

6.3 Subcontractors

GEI has subcontracted the following firms to assist in performing work on this project:

Subcontractor Information	
Company Name/Address:	
Contact Name:	Cell: (XXX) XXX-XXXX
Scope of Work:	

You can confirm if your subcontractor is approved by checking our pre-approved list: Approved Subcontractor List. If they are not listed, provide them the Safety Pre-Qualification Process Letter to submit their safety information for our review.

GEI requires its subcontractors to work in a responsible and safe manner. Subcontractors hired by GEI are required to submit documentation of their safety practices as part of GEI's Subcontractor Safety Prequalification for evaluation and approval before the start of work. Subcontractors for this project will be required to develop their own HASP for protection of their employees, but, at a minimum, must adhere to applicable requirements set forth in this HASP. The PM will obtain applicable safety certifications and training records from the subcontractor's site supervisor prior to the initiation of work.

7. Training Requirements

Prior to commencement of field activities, the PM or their designee will verify GEI field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. This training will be documented on the applicable JHAs (Appendix B). Personnel that have not received project-specific training will not be allowed on site.

Applicable Site-Specific Training Requirements *(check all that apply)*		
✔ HAZWOPER (8Hr Refresher)	☐ Railroad	☐ Other:
☐ HAZWOPER (Site Supervisor)	☐ Transportation Worker Identification Credential (TWIC)	☐ Other:
✔ First Aid/CPR	☐ MSHA (Mine Safety and Health Administration)	☐ Other:

7.1 On-Site Safety Briefings

GEI personnel will be given health and safety briefings daily (or as frequently as needed) by the SSM or their designee to plan for conducting work activities safely. The briefing will include GEI subcontractors and others as appropriate. The briefings can include information on:

- Applicable JHAs
- Changes in work practices
- Changes in environmental conditions
- Anticipated weather
- Evacuation/emergency procedures
- Air monitoring results
- Safety inspection results

Documentation of these briefings will be recorded in the GEI field book or the Tailgate Safety Briefing Form (Appendix D). For long-term projects, the Tailgate Safety Briefing Form is preferred.

8. Medical Surveillance Program

GEI maintains a medical surveillance program under the supervision of the Safety Director that includes a plan designed specifically for field personnel engaged in work at sites where hazardous materials may be present. Field personnel undergo an initial physical examination, including a detailed medical and occupational history before they are able to engage in work at hazardous waste sites. Upon successful completion of the examination, personnel are provided a medical clearance from an occupational health physician stating their fitness to perform the specified work activities. Employees who are part of this program will schedule and attend annual exams 12 months from the date of their previous exam.

If a GEI employee or other project worker shows symptoms of exposure to a hazardous substance and wishes to be seen by a doctor, GEI will consult with their third-party medical administrator and provide access to the nearest area hospital or medical facility.

GEI subcontractor personnel that will enter any hazardous waste sites must certify that they are participating in a medical surveillance program that complies with OSHA regulations for hazardous waste operations (i.e., 29 CFR 1910.120 and 29 CFR 1926.65). A copy of their medical clearance will be submitted to the GEI PM or SSM prior to the start of field activities.

9. Personal/Work Zone Air Monitoring

Personal/Work Zone Air Monitoring Required?	
☒ Yes	☐ No*

Air monitoring will be performed to identify and quantify airborne levels of hazardous substances and atmospheric hazards to determine the appropriate level of worker protection needed on-site.

Work on this project requiring air monitoring includes:

Personal/Work Zone Air Monitoring Tasks *(check all that apply)*		
☒ Excavation	☐ Confined Space Entry	☐ Other:
☒ Soil Sampling	☐ Indoor Drilling	☐ Other:
☐ GW Monitoring Well Headspace	☐ Product Sampling	☐ Other:

The following air monitoring equipment will be on site:

Personal/Work Zone Air Monitoring Equipment *(check all that apply)*	
☒ PID with 10.6 eV lamp or equivalent	☒ Particulate Meter (PM-10 capable)
☐ Drager Chip Measurement System (CMS) with appropriate gas detection chips	☐ Multi-gas meter: lower explosive limit (LEL) / oxygen (O_2) / hydrogen sulfide (H_2S) / hydrogen cyanide (HCN) or carbon monoxide (CO) meter
☐ Sensodyne Gas Detection Pump with appropriate gas detector tubes	☐ Other:

GEI will conduct and document on-site work zone monitoring and will inform GEI employees of the results. ***If Action Levels are exceeded, immediately implement site action(s) according to Action Table below and notify the PM***.

9.1 Calibration

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

9.2 Action Levels

The tables below provide a summary of real time air monitoring Action Levels and contingency plans for work zone activities. The below Action Levels are determined by halving the Permissible Exposure Limits (PELs) or Threshold Limit Values (TLVs) as set forth by OSHA and the American Conference of Government Industrial Hygienists (ACGIH).

9.2.1 VOC Monitoring and Control

Air monitoring reduces the risk of overexposure by indicating when action levels have been exceeded and when PPE must be upgraded or changed. Based on the volatile organic compounds (VOCs) listed in Table 4, determine which constituent has the lowest permissible exposure limit (PEL). This data is used to determine the action levels needed including respiratory protection at the project site. GEI's action level is half of the PEL listed in Table 4 (exception is made for benzene).

Exposure to organic COC can be evaluated and/or controlled by:

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

Air Monitoring Instrument	Action Level (above background)	Site Action
Action Levels for the following parameters are 15-minute time weighted averages (TWA), not a single exceedance.		
PID (Monitoring for VOCs)	0.0 – 50 ppm	No respiratory protection is required if VOCs are not present. (If benzene or naphthalene are constituents of interest at this site, follow the action levels below for benzene and/or naphthalene.)
	> 50 ppm	Stop work, withdrawal from work area, institute engineering controls, if levels persist, upgrade to Level C. Notify PM and Safety Team.
PID (Monitoring for benzene)	0.0 - 1.0 ppm	No respiratory protection is required if benzene is not present. Use detector tube for benzene to verify if concentration of 1.0 ppm or greater is benzene.
	1.0 – 50 ppm	If benzene is present (confirmation via detector tube), stop work and contact your PM. If work continues and benzene is present, or no detector tubes are used to determine presence, upgrade to Level C. No respiratory protection is required if benzene is not present.
	> 50 ppm	Stop work, withdraw from work area, notify PM and Safety Team.

Air Monitoring Instrument	Action Level (above background)	Site Action
PID (Monitoring for naphthalene)	0.0 - 5 ppm	No respiratory protection is required if naphthalene is not present. Use Sensodyne detector tube for naphthalene to verify if concentration of 5 ppm or greater is naphthalene.
	5 – 50 ppm	If naphthalene is present (confirmation via detector tube), stop work and contact your PM. If work continues and naphthalene is present or no detector tubes are used to determine presence, upgrade to Level C. No respiratory protection is required if naphthalene is not present.
	> 50 ppm	Stop work, withdraw from work area, notify PM and Safety Team.

9.2.2 Dust Monitoring and Control

Some COC hazards may become hazardous when they are associated with dust/particles and become airborne. For worker safety, dust levels must be managed to eliminate this hazard. Dust generated during activities can cause irritation to the respiratory system and eyes. Contaminants can also be carried in airborne dust causing potential exposure to workers through skin contact and inhalation. Constituent concentrations on site are expected to be low therefore the exposure hazard through inhalation should be minimal; however, contaminant contact through skin and clothing can introduce additional exposures.

For dust generated during site activities which exceed site-specific limits, engineering controls such as water application will be used to control dust concentrations. However, if excessive dust concentrations cannot to be handled through engineering controls, then respirators will be required to be worn.

Air Monitoring Instrument	Action Level (above background)	Site Action
Action Levels for the following parameters are 15-minute time weighted averages (TWA), not a single exceedance.		
Particulate Meter	150 µg/m^3	Implement work practices to reduce/minimize airborne dust generation, e.g., spray/misting of soil with water. Don respirator with particulate filters if action levels remain in exceedance.

10. Site Control

10.1 Site Zones

Site zones are intended to control the potential spread of contamination and to assure that only authorized individuals are permitted into potentially hazardous areas. This project is being conducted under the requirements of 29 CFR 1910.120, and any personnel working in an area where the potential for exposure to site contaminants exists, will only be allowed access after proper training and medical documentation.

10.2 Buddy System

GEI personnel should be in line-of-site or communication contact with another on-site person. The other on-site person should be aware of his or her role as a "buddy" and be able to help in the event of an emergency. Some projects may not support the need for the buddy system to be implemented. If this is the case, the PM is required to conduct regular check-ins with the employee on site.

10.3 Sanitation for Temporary Work Sites

Sanitation requirements identified in the OSHA Standard 29 CFR 1926.51 "Sanitation" specifies that employees working at temporary project sites have at least one sanitary facility available to them. The nearest sanitary facilities are located at the Fastrac gas station at 3388 Seneca Turnpike, Canastota, NY 13032.

10.4 Illumination

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

10.5 Smoking

Smoking is prohibited at or in the vicinity of hazardous operations or materials. Where smoking is permitted, safe receptacles will be provided for smoking materials.

10.6 Alcohol and Drug Abuse Prevention

Alcohol and drugs will not be allowed on the site. Project personnel under the influence of alcohol or drugs will not be allowed to enter the site. All GEI employees must comply with GEI's Controlled Substance Use & Alcohol Misuse Policy found on the Safety Resources page of GEI Connections. Employees may be subject to random drug and/or alcohol testing if required by a client at a project site.

11. Incident Reporting

GEI will report incidents involving GEI personnel or subcontractor personnel, such as: lost time injuries, injuries requiring medical attention, near miss incidents, fires, fatalities, accidents involving the public, chemical spills, vehicle accidents, and property damage. The following steps must be followed when an incident occurs:

1. For incidents involving life-threatening situations or serious injury that require emergency response personnel (Police, Fire, EMS), call 9-1-1 from a safe area.
2. **Stop work** activity to address any injury, illness, property damage, spill, or other emergency.
3. Call Medcor Triage at 1-800-775-5866 to speak with a medical professional following any injury or illness.
4. Notify the Project Manager of the incident or injury.
5. The Project Manager will immediately inform the Safety Director, GEI National Grid Client Manager, and the Project-Specific National Grid Representative of any accident, incident, injury or near miss.
6. Complete an incident report using the GEI Incident Report Form located on the GEI Safety Smartphone App, GEI Connections intranet page, or in the project HASP.
7. Resume work activity if all steps above have been completed and it is safe to do so.
8. A DRAFT Incident Report Form including root cause/corrective actions will be completed by a member of the Safety Team and submitted to the Project-Specific National Grid Representative within 4 hours.
9. A FINAL Incident Report will be submitted within 24 hours via e-mail to the Project-Specific National Grid PM, National Grid Regional Safety Lead, and/or the person to whom the verbal notification was initially provided.

All Work will be suspended until contact is made with the Project-Specific PM so that National Grid can assess if continued work suspension or if a stand down is necessary. If the National Grid PM cannot be reached, contact the National Grid SIR Regional Safety Lead as noted on the following table.

Name	Region	Phone Numbers	E-Mail
William Ryan	Downstate NY	W- (516) 545-2586 C - (516) 790-1660	William.Ryan@nationalgrid.com
Brian Stearns	Upstate NY	W- (315) 428-5731 C - (315) 461-7892	Brian.Stearns@nationalgrid.com
Elizabeth Greene	MA/RI	W- (781) 907-3656 C- (781) 248-6469	Elizabeth.Greene@nationalgrid.com

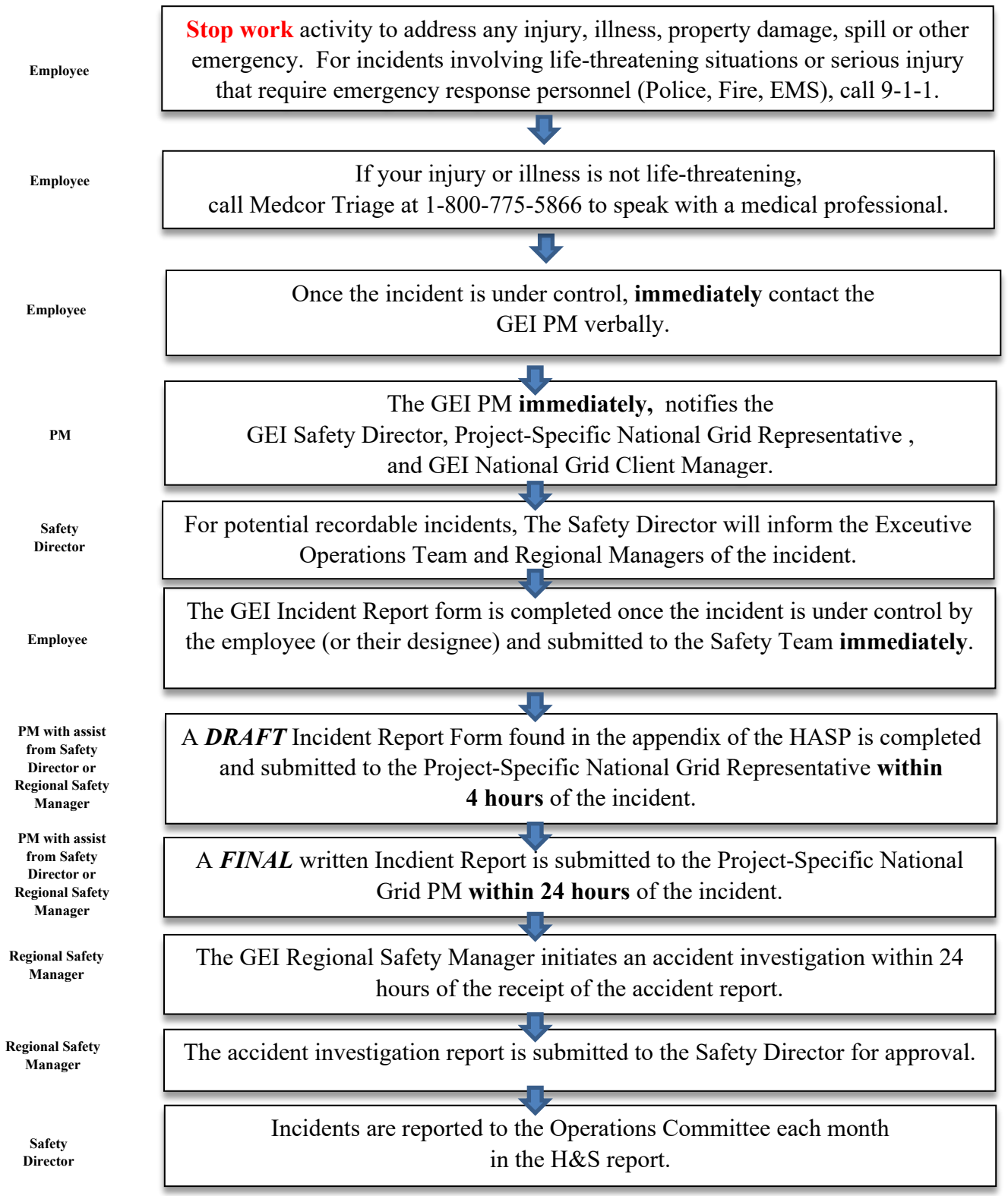
For vehicle accidents involving another vehicle or damage to property, the employee will take pictures of each vehicle or property involved in the incident and obtain a police report. In some municipalities police will not be dispatched to a non-injury accident, but every effort needs to be made to try and obtain the report.

The Incident Report Form and the Near Miss Reporting Form can be found in Appendix D, on the GEI Health and Safety smartphone app, or on the Safety Resources page of GEI Connections. To report subcontractor injuries or incidents, follow the same verbal reporting procedures and submit an email describing the event to the PM and the Safety Team. A representative with knowledge of the incident should be available to provide incident information until the investigation is completed by National Grid.

11.1 Injury Triage Service

If a GEI employee experiences a work-related injury that is not life-threatening, the employee will initiate a call to Medcor Triage at 1-800-775-5866. The injured employee will detail any medical symptoms or complaints which will be evaluated by a Registered Nurse (RN) specially trained to perform telephonic triage. The RN will recommend first aid self-treatment or refer the injured employee for an off-site medical evaluation by a health professional at a clinic within GEI's workers compensation provider network. GEI employees are still required to follow our Accident Reporting procedures as listed above.

11.2 Flow Chart for Accident Reporting



12. Decontamination Procedures

Site decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may come in contact with personnel or equipment. These procedures minimize contact with contaminants and protect against the transfer of contaminants to clean areas. They also extend the useful life of PPE by reducing the amount of time that contaminants contact and can permeate PPE surfaces. This project is being conducted under the requirements of 29 CFR 1910.120(k), and any personnel or equipment that are exposed to site contaminants will follow applicable decontamination procedures.

12.1 Personnel and PPE Decontamination

A decontamination station where employees can drop equipment and remove PPE will be set up to minimize the potential for hazardous skin or inhalation exposure and to avoid cross-contamination and chemical incompatibilities. It will be equipped with basins for water and detergent, and trash bag(s), or cans for containing disposable PPE and discarded materials. Once personnel have decontaminated at this station and taken off their PPE, they will wash themselves wherever they have potentially been exposed to any contaminants (e.g., hands, face, etc.)

Contaminated PPE (gloves, suits, etc.) will be decontaminated and stored for reuse or placed in plastic bags (or other appropriate containers) and disposed of in an approved facility. Decontamination wastewater and used cleaning fluids will be collected and disposed of in accordance with applicable state and federal regulations.

12.2 Equipment Decontamination

All tools, equipment, and machinery that have come into contact with contaminated media, will be decontaminated on site prior to departure. Equipment decontamination procedures are designed to minimize the potential for hazardous skin or inhalation exposure and to avoid cross-contamination and chemical incompatibilities. If your project has equipment decontamination specification refer to where those can be found (work plan, specs, etc.)

13. Emergency Response

13.1 Evacuation

Prior to the start of work, emergency procedures must be identified and communicated to workers on site. This includes evacuation routes, safe areas, and/or muster points (Figure 1). Also communicate how employees will be notified that an emergency or evacuation of the site is occurring (audio alarms, visible (light) alarms, radios, sirens, etc.) Upon discovering an emergency situation, personnel will notify the SSM, who will initiate an appropriate response. Once the scene is safe, use the incident report procedures to report the evacuation to the PM and Safety Team.

13.2 Fire

In the event of a fire personnel will evacuate the area to the muster point located on Figure 1. GEI's SSM will contact the local fire department with jurisdiction and report the fire. The SSM will account for GEI personnel and subcontractor personnel and report their status to the PM. Incident reporting procedures will be followed once the scene is safe.

13.3 Spills or Material Release

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

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

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

13.4 Medical Support

In case of minor injuries, on-site care will be administered with the site first aid kit. A GEI employee certified by the American Red Cross or other American Health & Safety Institute (ASHI) will be on-site at all times. For serious injuries, call 911 and request emergency medical assistance. Seriously injured persons should not be moved unless they are in immediate danger. Notify the PM of the emergency and follow incident reporting procedures.

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

Table 1 of this HASP contains detailed emergency information, including directions to the nearest hospital, and a list of emergency services and their telephone numbers. In addition, Appendix A includes a map to the local hospital/emergency room and Figure 1 indicates the evacuation route (including muster point).

13.5 Severe Weather

The contingency plan for severe weather includes reviewing the expected weather to determine if severe weather is in the forecast. Severe weather includes high winds over 40 miles per hour (mph), heavy rains or snow squalls, thunderstorms, tornados, and lightning storms. If severe weather is approaching, the decision to evacuate GEI personnel and subcontractor personnel from the site will be the responsibility of GEI's SSM. Notification of evacuation will be made to the PM. The SSM will account for GEI personnel and subcontractor personnel and report their status to the PM. If safe, work can resume 30 minutes after the last clap of thunder or flash of lightning.

13.6 Hazard Communication Plan

GEI personnel have received hazard communication (HAZCOM) training as part of their annual safety training and new employee safety orientation training. Hazardous materials brought on site will be properly labeled, stored, and handled. SDSs for each chemical will be included in this HASP in Appendix C. GEI's HAZCOM program can be found on the Safety Resources page of GEI Connections (Appendix E).

14. Health and Safety Plan Sign-Off

GEI personnel conducting site activities will be familiar with the information in this HASP. After reviewing this plan, please sign the copy in the project files, and bring a copy of the plan with you to the site. By signing this site-specific HASP, you are agreeing that you have read, understand, and will adhere to the provisions described in this plan while working on the site below.

Site Name: Canastota Non-Owned Former MGP Site

GEI Project No: 034390.1.1031

Print Name	Signature
Project Manager: Dan Kopcow	

Figure

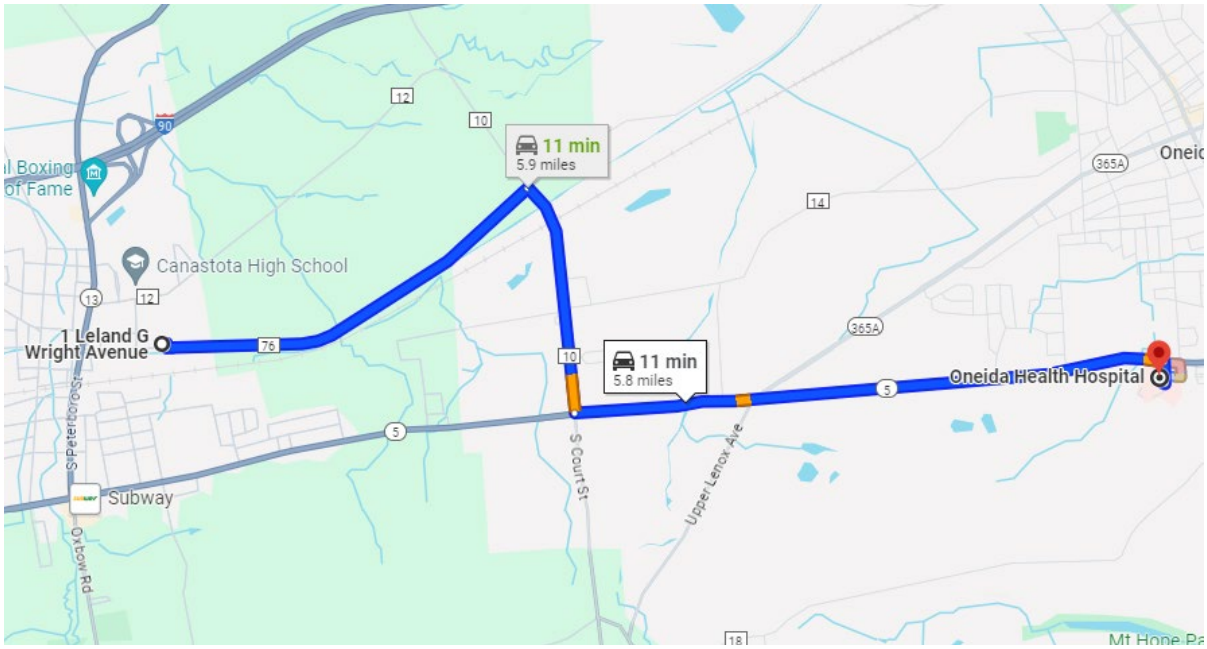
Figure 1. Site Location and Muster Point

Appendix A

Hospital Directions

Hospital Information	
Oneida Health Hospital: 321 Genesee Street Oneida, NY 13421	(315) 363-6000

Map to Hospital:



Directions to Hospital:

1 Leland G Wright Ave
Canastota, NY 13032

- Head south on Leland G Wright Ave toward Canal St
  112 ft
- Turn left onto Canal St
  1.9 mi
- Turn right onto N Court St
  1.1 mi
- Turn left onto Genesee St
  2.7 mi
- Turn right onto Fields Dr
  0.1 mi
- Turn right
  62 ft
- Turn right
  Destination will be on the right
  56 ft

Oneida Health Hospital
321 Genesee St, Oneida, NY 13421

Scan this QR code or click the link for access to Google Maps to type in the address of your local hospital.

Appendix B

Job Hazard Analyses

Job Hazard Analysis

Task	Driving – Site Mobilization		
Project Name/Number	Canastota Non-Owned Former MGP Site/034390	**Client Name**	National Grid
GEI Project Manager	Daniel Kopcow	**PM Review Date**	7-17-24
Tools/Equipment Used	GEI fleet vehicle, rental vehicle, or personal vehicle		
Task Specific Training	GEI Annual Safety Training (Field or HAZWOPER), First Aid/CPR		
Personal Protective Equipment (PPE)	☐ Hard Hat ☐Safety Glasses ☐Safety-Toed Boots ☒ Reflective Vest ☐Hearing Protection ☐ Personal Flotation Device (PFD) ☐ Face Shield ☐ Chaps ☐ Tyvek clothing/boots ☐ Flame Resistant Clothing ☐ Gloves Nitrile ☐Respirator ☐Other		

JHA Prepared By: Hannah Clarida	Date: 05/24/2024	Approved by: Jessie Papageorge	Date: 7/8/24

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
1. Inspect Vehicle	Slips/trips/falls	Hazard Identification HS-026 Driver Safety HS-004	• Walk around vehicle to inspect for any vehicle safety issues or hazards that could be within the travel path. • Adjust mirrors and seats prior to driving. • Becoming familiar with dashboard, center console, and steering controls. • Locate the turn signals, windshield wipers, lights, emergency flashers, and the heating, air conditioning, and defrost controls. • Use a spotter if needed when backing up.
2. Driving	Struck by/crushing hazards	Driver Safety SOP HS-004	• Employees must wear their safety belt while in a moving vehicle. • Employees will follow safe driving behaviors, which include limiting distractions such as manipulating radios or other equipment that may cause a distraction. Employees will not exceed the posted speed limit and will maintain a safe distance between other vehicles. • Use defensive driving techniques. • Avoid driving during hazardous weather conditions.

[1] Use the hierarchy of controls to determine applicable hazard controls for the task in order of most effective to least effective: Elimination (physically remove the hazard), Substitution (replace the hazard), Engineering Controls (Isolate the team from the hazard), Administrative Controls (change the way people work), PPE (personal protective equipment).

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
			• Driving distance and time after a 12-hour shift will not exceed 30 miles or 30 minutes (whichever is greater). • Vehicle accidents will be reported in accordance with GEI's accident reporting procedures.
3. Parking Vehicle	Struck by, crushing hazards, security	Driver Safety SOP HS-004	• Be aware of surrounding conditions. Park in designated areas or a safe area away from heavy equipment. • Position the vehicle in a manner which reduces or eliminates the need to operate the vehicle in reverse. Choose an easy-exit parking space, like pull-through or where no one else is parked. • Don't crowd neighboring vehicles; be sure to park your vehicle in the middle of your space. • Secure equipment and supplies in the trunk or where they cannot be seen. Or take items with you if they cannot be hidden. • If at night, park in well-lit areas.
4. Site Entry	Slips/trips/falls, struck by, crushing	Working Around Heavy Equipment HS-018 Hazard Identification HS-026	• Don appropriate PPE prior to walking on site. • Identify yourself and your work location to heavy equipment operators, so they may incorporate you into their operations. • Stay Alert! Pay attention to equipment backup alarms and swing radii. • Avoid distractions like using cell phones while traversing the site.
5. Backing Up Vehicle	Struck by, crushing	Driver Safety HS-004	• Before entering your vehicle do a walk-around. Check for fences, poles, drop-offs, buildings, etc. • Know your clearances. While performing your walk-around also check for obstructions, low hanging eaves and tree limbs, wires, and any other potential clearance-related obstacles. • Use a spotter. Do not allow the spotter to be positioned directly behind your vehicle or walk backwards behind you while giving instructions. They should be off to the driver's side where you can see them in your side mirror.

Job Hazard Analysis

Task	Drum Handling/Staging		
Project Name/Number	Canastota Non-Owned Former MGP Site/034390	**Client Name**	National Grid
GEI Project Manager	Daniel Kopcow	**PM Review Date**	7-17-24
Tools/Equipment Used	Drum opening tools (bung wrench/lid tool/drum dolly)		
Task Specific Training	GEI Annual Safety Training (HAZWOPER), First Aid/CPR		
Personal Protective Equipment (PPE)	☐ Hard Hat ☒Safety Glasses ☒Safety-Toed Boots ☒ Reflective Vest ☐Hearing Protection ☐ Personal Flotation Device (PFD) ☐ Face Shield ☐ Chaps ☐ Tyvek clothing/boots ☐ Flame Resistant Clothing ☒ Gloves Nitrile, Cut resistant ☒Respirator if action levels are exceeded ☐Other		

JHA Prepared By: Hannah Clarida	Date: 05/24/2024	Approved by: Jessie Papageorge	Date: 7/8/24

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
1. Mobilize On Site/Equipment Setup	Slips/trips/falls, stuck by, crushing hazards	Hazard Identification HS-026	• Wear PPE that properly fits, is in good condition, and is appropriate for the activities and hazards. • Maintain good visibility of the work area. • Avoid walking on uneven, steeply sloped, or debris ridden ground surfaces. • Plan tasks prior to preforming them including an activity hazard analysis. • Keep trafficked areas free from slip/trip/fall hazards. • Wear shoes with traction. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to work areas, on steeply sloped areas, or where steep areas must be traversed to reach work areas.
2. Opening/Closing Drums	Contaminant Contact, Cuts or Abrasions Heavy Lifting ,	Container Management HS–003 Ergonomic Program	• Wear proper PPE during sampling including work gloves/nitrile gloves, safety glasses and face shield as appropriate. • Confirm the drum is upright and stable to avoid tipping while

[1] Use the hierarchy of controls to determine applicable hazard controls for the task in order of most effective to least effective e: Elimination (physically remove the hazard), Substitution (replace the hazard), Engineering Controls (Isolate the team from the hazard), Administrative Controls (change the way people work), PPE (personal protective equipment).

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
	Slips/Trips/Falls		opening the drum. • Inspect the drum prior to opening. Do not handle drums with bulging sides. When a drum or container exhibits signs of over-pressurization such as swelling or bulging, the drum or container is not to be moved until the cause of the over-pressurization has been determined and proper containment procedures have been implemented. • Inspect drum tools before use. If equipment is damaged, tag it, and do not use. • If the drum has been sealed for a long time, or has been exposed to changes in temperature, there may be pressure built up inside. Gently tap the bung holes with a rubber mallet, and remove the caps with a drum wrench or drum opening tool/pair of pliers to release pressure. • Use drum wrench to loosen the ring clamp around the outside of the drum. • Once the ring is removed, if the lid cannot be removed easily, tap around the entire edge of the lid with a hammer, then use a drum opening tool/wrench to pry the lid away from your body. • Do not use picks or chisels to open drums. • Do not lean over open drums or stand on closed drums. • Dispose of gloves after use and wash hands. • Wear work gloves over nitrile gloves.
3. Moving/Staging Drums	Contaminant Contact, Cuts or Abrasions Heavy Lifting , Slips/Trips/Falls	Container Management HS–003 Manual Lifting HS–025 Ergonomic Program	• Wear proper PPE during sampling including nitrile gloves and safety glasses and face shield as appropriate. • Before moving, check the drum for damage and confirm the bung/lid is securely fastened. Use proper tools to secure. • Confirm the pathway you plan to take is clear and free from debris. • Confirm the drum dolly being used is in a good condition and is designed to handle the specific drum-type being handled; some drum dollies cannot handle plastic open-top drums. • Do not attempt to move drums up and down steep slopes with manual equipment not intended for the application. • Operate drum hand trucks with a straight back using two hands and your leg if required by the design of the trolley; confirm no one is standing close to the load during manipulation. • Do not handle drums with bulging sides. • Dispose of gloves after use and wash hands.

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
			• Wear work gloves over nitrile gloves. • Use proper lifting techniques. • Ask fellow worker for help.
4. Demobilize from site	Personal/material security, slips/trips/falls	Hazard Identification HS-026	• Confirm all materials are secured/labeled, including drums and any equipment left on site. • Clean all equipment/tools prior to leaving. • Secure any gates/locks. • Notify project manager (or designee) you are leaving the site.

Job Hazard Analysis

Task	**Excavation/Construction Oversight**		
Project Name/Number	Canastota Non-Owned Former MGP Site/034390	**Client Name**	National Grid
GEI Project Manager	Daniel Kopcow	**PM Review Date**	7-17-24
Tools/Equipment Used	Field book, phone camera		
Task Specific Training	GEI Annual Safety Training (Field or HAZWOPER), First Aid/CPR		
Personal Protective Equipment (PPE)	☒ Hard Hat ☒Safety Glasses ☒Safety-Toed Boots ☒ Refective Vest ☒Hearing Protection ☐ Personal Flotation Device (PFD) ☐ Face Shield ☐ Chaps ☐ Tyvek clothing/boots ☐ Flame Resistant Clothing ☐ Gloves ☐Respirator ☐Other		

JHA Prepared By: Abigail Jock	**Date: 07/12/2024**	**Approved by: Jessie Papageorge**	**Date: 7/17/24**

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
1. Mobilize on site	Heavy lifting, strains/sprains, slip/trips/falls, pinch points, struck by, crushing hazards	Working Around Heavy Equipment HS-018, Manual Lifting HS-025, Hazard Identification HS-026 GEI Ergonomic Program, GEI Personal Protective Equipment Program	• Don appropriate PPE that properly fits, is in good condition, and is suitable for the activities and hazards. • Check in with appropriate heavy equipment operator personnel as applicable. • Maintain good visibility of the work area. • Avoid walking on uneven, steeply sloped, or debris ridden ground surfaces. • Plan tasks prior to preforming them including an activity hazard analysis. • Keep trafficked areas free from slip/trip/fall hazards. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to work areas, on steeply sloped areas, or where steep areas must be traversed to reach work areas. • Use the buddy system when necessary.

[1] Use the hierarchy of controls to determine applicable hazard controls for the task in order of most effective to least effective: Elimination (physically remove the hazard), Substitution (replace the hazard), Engineering Controls (Isolate the team from the hazard), Administrative Controls (change the way people work), PPE (personal protective equipment).

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
2. Conducting project activities around/near heavy equipment operations	Slip/trips/falls, pinch points, struck by, crushing hazards, unstable or non-secured load, noise exposure	Noise Exposure HS-012, Traffic Hazards HS-016, Working Around Heavy Equipment HS-018, Hazard Identification HS-026 GEI Ergonomic Program, GEI Personal Protective Equipment Program,	• Wear hardhat, high visibility safety vest, steel-toed, steel-shank boots or EH-rated safety boots with coposie toe and shank, safety glasses, nitrile/neoprene gloves, and earplugs. • Identify yourself and your work location to heavy equipment operators so they may incorporate you into their operations. • Coordinate hand signals with operators and field staff. • Approach heavy equipment from the front so operator can see you. • Stay alert! Pay attention to equipment backup alarms and swing radii. • Wear high visibility safety reflective vest when working near equipment and/or motor vehicle traffic. • Position yourself in a safe location when filling out logs or talking with contractor or other field staff. • Notify the contractor immediately if any problems arise. • Do not stand or sit under suspeneded loads or near any pressurized equipment lines. • Do not sit and stand near heavy equipment that is when materials are being unloaded, loaded, etc. • If a task requires inspection of materials, this should be done after they are securely stored. • Do not operate cellular telephones in the vicinity of heavy equipment operation.
3. Demobilize from site	Personal/material security, slips/trips/falls	Hazard Identification HS-026	• Confirm all materials are secured/labeled, including drums and any equipment left on site. • Confirm that any open trenches/pits are properly marked or barricaded. • Clean all equipment/tools prior to leaving. • Secure any gates/locks. • Notify project manager (or designee) you are leaving the site.

Job Hazard Analysis

Task	**Soil Sampling - Trench**		
Project Name/Number	Canastota Non-Owned Former MGP Site/034390	**Client Name**	National Grid
GEI Project Manager	Daniel Kopcow	**PM Review Date**	7-17-24
Tools/Equipment Used	Excavator (operated by subcontractor), trowel, sample jars, decon equipment		
Task Specific Training	GEI Annual Safety Training (Field or HAZWOPER), First Aid/CPR		
Personal Protective Equipment (PPE)	☒ Hard Hat ☒Safety Glasses ☒Safety-Toed Boots ☒ Reflective Vest ☐Hearing Protection ☐ Personal Flotation Device (PFD) ☐ Face Shield ☐ Chaps ☐ Tyvek clothing/boots ☐ Flame Resistant Clothing ☒ Gloves Nitrile ☐Respirator ☐Other		

JHA Prepared By: Abigail Jock	**Date: 07/12/2024**	**Approved by: Jessie Papageorge**	**Date: 7/17/24**

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
1. Mobilize on site	Heavy lifting, strains/sprains, slip/trips/falls, pinch points, struck by, crushing hazards	Working Around Heavy Equipment HS-018 Manual Lifting HS-025 Hazard Identification HS-026 GEI Ergonomic Program GEI Personal Protective Equipment Program	• Don appropriate PPE that properly fits, is in good condition, and is suitable for the activities and hazards. • Check in with appropriate heavy equipment operator personnel as applicable. • Maintain good visibility of the work area. • Avoid walking on uneven, steeply sloped, or debris ridden ground surfaces. • Plan tasks prior to preforming them including an activity hazard analysis. • Keep trafficked areas free from slip/trip/fall hazards. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to work areas, on steeply sloped areas, or where steep areas must be traversed to reach work areas. • Use the buddy system when necessary.

[1] Use the hierarchy of controls to determine applicable hazard controls for the task in order of most effective to least effective: Elimination (physically remove the hazard), Substitution (replace the hazard), Engineering Controls (Isolate the team from the hazard), Administrative Controls (change the way people work), PPE (personal protective equipment).

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
2. Utility survey	Shock, Explosion, Fire	Utility Mark Out HS-014	• Confirm that all utilities have been properly marked prior to beginning work. • If a utility strike occurs, call the appropriate authorities immediately. Clear the area and do not delay.
3. Conduct project activities around/near heavy equipment operations	Slip/trips/falls, pinch points, struck by, crushing hazards, unstable or non-secured load, noise exposure	Noise Exposure HS-012 Traffic Hazards HS-016 Working Around Heavy Equipment HS-018 Hazard Identification HS-026 GEI Ergonomic Program GEI Personal Protective Equipment Program	• Identify yourself and your work location to heavy equipment operators so they may incorporate you into their operations. • Coordinate hand signals with operators and field staff. • Approach heavy equipment from the front so operator can see you. • Stay alert! Pay attention to equipment backup alarms and swing radii. • Wear high visibility safety reflective vest when working near equipment and/or motor vehicle traffic. • Position yourself in a safe location when filling out logs or talking with contractor or other field staff. • Notify the contractor immediately if any problems arise. • Do not stand or sit under suspended loads or near any pressurized equipment lines. • Do not sit and stand near heavy equipment that is when materials are being unloaded, loaded, etc. • If a task requires inspection of materials, this should be done after they are securely stored. • Do not operate cellular telephones in the vicinity of heavy equipment operation.
4. Soil Sampling – Trowel (or similar)	Contaminant Exposure, Cuts/Scrapes, Repetition, Slips/Trips/Falls	Hazard Identification HS-026/Container Management HS-003	• GEI Employees will not enter a trench that does not comply with the OSHA standard, 29 CFR 1926.650. • GEI may enter trenches or excavations less than 5 feet deep which has been inspected and deemed safe by a competent person. • Atmosphere in the trench shall be tested before employees enter excavations greater than 4 feet in depth. • Heavy equipment and spoils should be kept at least 2 feet away from trench edges. • Inspect equipment or tools prior to use. Tag and remove from service if tool is damaged. • Dispose of gloves after use and wash hands. • Wear work gloves over nitrile gloves. • Take regular breaks and do not work in unusual positions for long

Task Steps	Potential Hazards	GEI SOP or Program	Hazard Controls[1]
			periods of time. • Keep trafficked areas free from slip/trip/fall hazards.
5. Pack Soil Samples	Heavy lifting, cuts, or abrasions	Manual Lifting HS–025 Ergonomic Program	• Confirm that the lids on all bottles are tight (will not leak). • Place cushioning/absorbent material in the bottom of the cooler and then place the containers in the cooler with sufficient space to allow for the addition of cushioning between the containers. • Use proper dollies or other lifting tools. • Use proper lifting techniques. • Take regular breaks and do not work in unusual positions for long periods of time. • If glassware breaks, dispose of in puncture-resistant containers. Use cut resistant gloves to handle any broken glass.
6. Equipment Decontamination	Contaminant Contact, Cuts or Abrasions, Slips/Trips/Falls	Hazard Identification HS–026 Ergonomic Program	• Wear nitrile gloves and glasses to provide eye protection from splashing. • Wash hands immediately after use. • Take regular breaks and do not work in unusual positions for long periods of time. • Keep trafficked areas free from slip/trip/fall hazards.
7. Demobilize from site	Personal/material security, slips/trips/falls	Hazard Identification HS-026	• Confirm all materials are secured/labeled, including drums and any equipment left on site. • Confirm that any open trenches/pits are properly marked or barricaded. • Clean all equipment/tools prior to leaving. • Secure any gates/locks. • Notify project manager (or designee) you are leaving the site.

Appendix C

Safety Data Sheets

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

1 Identification of the substance/mixture and of the supplier

1.1 Product identifier

Trade Name: Alconox
Synonyms:
Product number: Alconox

1.2 Application of the substance / the mixture : Cleaning material/Detergent

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer	Supplier
Alconox, Inc. 30 Glenn Street White Plains, NY 10603 1-914-948-4040	Not Applicable

Emergency telephone number:
ChemTel Inc
North America: 1-800-255-3924
International: 01-813-248-0585

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:
Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

2.2 Label elements:

Skin irritation, category 2.
Eye irritation, category 2A.

Hazard pictograms:

Signal word: Warning

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Additional information: None.

Hazard description

Hazards Not Otherwise Classified (HNOC): None

Information concerning particular hazards for humans and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients

3.1 Chemical characterization : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	12-28
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	2-16

3.4 Additional Information : None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

4.2 Most important symptoms and effects, both acute and delayed

None

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None

5.2 Special hazards arising from the substance or mixture :

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Protective equipment:

Wear protective eye wear, gloves and clothing.
Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures :

Ensure adequate ventilation.
Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None

7 Handling and storage

7.1 Precautions for safe handling :

Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.

7.2 Conditions for safe storage, including any incompatibilities :

Store in a cool, well-ventilated area.

7.3 Specific end use(s):

No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

8 Exposure controls/personal protection

8.1 Control parameters :

7722-88-5, Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3.

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	**Explosion limit lower:** **Explosion limit upper:**	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	**Vapor pressure at 20°C:**	Not determined or not available.
Odor threshold:	Not determined or not available.	**Vapor density:**	Not determined or not available.
pH-value:	9.5 (aqueous solution)	**Relative density:**	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	**Solubilities:**	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water):**	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature:**	Not determined or not available.
Evaporation rate:	Not determined or not available.	**Decomposition temperature:**	Not determined or not available.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Flammability (solid, gaseous):	Not determined or not available.	**Viscosity**:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
Density at 20°C:	Not determined or not available.		

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

11 Toxicological information

11.1 Information on toxicological effects :

Acute Toxicity:

Oral:

: LD50 > 5000 mg/kg oral rat - Product .

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Sodium Alkylbenzene Sulfonate: Causes skin irritation. .

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation .

Tetrasodium Pyrophosphate: Rabbit - Risk of serious damage to eyes .

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.
Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.
Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

PBT: No additional information.

vPvB: No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: None
ADR, ADN, DOT, IMDG, IATA

14.2 UN Proper shipping name: None
ADR, ADN, DOT, IMDG, IATA

14.3 Transport hazard classes:
ADR, ADN, DOT, IMDG, IATA

Class: None
Label: None
LTD. QTY: None

US DOT
Limited Quantity Exception: None

Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Non Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

	Comments: None	**Comments:** None
14.4	**Packing group:** ADR, ADN, DOT, IMDG, IATA	None
14.5	**Environmental hazards** :	None
14.6	**Special precautions for user:**	None
	Danger code (Kemler):	None
	EMS number:	None
	Segregation groups:	None
14.7	**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:** Not applicable.	
14.8	**Transport/Additional information:**	
	Transport category:	None
	Tunnel restriction code:	None
	UN "Model Regulation":	None

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.

North American

SARA

Section 313 (specific toxic chemical listings): None of the ingredients are listed.
Section 302 (extremely hazardous substances): None of the ingredients are listed.

CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable

Spill Quantity: None of the ingredients are listed.

TSCA (Toxic Substances Control Act):

Inventory: All ingredients are listed.
Rules and Orders: Not applicable.

Proposition 65 (California):

Chemicals known to cause cancer: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.

Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Germany MAK: Not classified.

Asia Pacific

Australia

Australian Inventory of Chemical Substances (AICS): All ingredients are listed.

China

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed.

Japan

Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed.

Korea

Existing Chemicals List (ECL): All ingredients are listed.

New Zealand

New Zealand Inventory of Chemicals (NZOIC): All ingredients are listed.

Philippines

Philippine Inventory of Chemicals and Chemical Substances (PICCS): All ingredients are listed.

Taiwan

Taiwan Chemical Substance Inventory (TSCI): All ingredients are listed.

16 Other information

Abbreviations and Acronyms: None

Summary of Phrases

Hazard statements:

H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

NFPA: 1-0-0

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

HMIS: 1-0-0

SAFETY DATA SHEET

Version 5.1
Revision Date 07/02/2014
Print Date 05/10/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	DEET
Product Number	:	36542
Brand	:	Sigma-Aldrich
Index-No.	:	616-018-00-2
CAS-No.	:	134-62-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	+1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning

Hazard statement(s)

H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.

P301 + P312	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P321	Specific treatment (see supplemental first aid instructions on this label).
P330	Rinse mouth.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	N,N-Diethyl-m-toluamide
Formula	:	$C_{12}H_{17}NO$
Molecular Weight	:	191.27 g/mol
CAS-No.	:	134-62-3
EC-No.	:	205-149-7
Index-No.	:	616-018-00-2

Hazardous components

Component	Classification	Concentration
Deet		
	Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Aquatic Acute 3; Aquatic Chronic 3; H302, H315, H319, H412	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 60 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: light yellow
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	111 °C (232 °F) at 1 hPa (1 mmHg)
g)	Flash point	95 °C (203 °F) - closed cup
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	< 0.01 hPa (< 0.01 mmHg) at 25 °C (77 °F)
l)	Vapour density	6.6 - (Air = 1.0)
m)	Relative density	0.998 g/cm3
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available

r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information

Relative vapour density 6.6 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents, Strong acids, Strong bases, Strong reducing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 1,950 mg/kg

LC50 Inhalation - rat - 5,950 mg/m3
Remarks: Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

LD50 Dermal - rat - 5,000 mg/kg

no data available

Skin corrosion/irritation
Skin - rabbit
Result: Skin irritation

Serious eye damage/eye irritation
Eyes - rabbit
Result: Moderate eye irritation

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity

rat
sperm

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Reproductive toxicity - rabbit - Oral
Maternal Effects: Other effects.

Reproductive toxicity - rat - Oral
Maternal Effects: Other effects. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: XS3675000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 110 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 75 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Deet	134-62-3	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Deet	134-62-3	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Irrit.	Eye irritation
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	1
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling

or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.1 Revision Date: 07/02/2014 Print Date: 05/10/2019

PURELL® VF481™ Hand Sanitizer Gel

Version 1.1 SDS Number: 400000000475 Revision Date: 01/29/2018

SECTION 1. IDENTIFICATION

Product name : PURELL® VF481™ Hand Sanitizer Gel

Manufacturer or supplier's details

Company name of supplier : GOJO Industries, Inc.

Address : One GOJO Plaza, Suite 500
Akron, Ohio 44311

Telephone : 1 (330) 255-6000

Emergency telephone number : CHEMTREC 1-800-424-9300
CHEMTREC +1-703-527-3887: Outside USA & CANADA

Recommended use of the chemical and restrictions on use

Recommended use : Hand Sanitizer

Restrictions on use : This is a personal care or cosmetic product that is safe for consumers and other users under normal and reasonably foreseeable use. Cosmetics and consumer products, specifically defined by regulations around the world, are exempt from the requirement of an SDS for the consumer. While this material is not considered hazardous, this SDS contains valuable information critical to the safe handling and proper use of the product for industrial workplace conditions as well as unusual and unintended exposures such as large spills. This SDS should be retained and available for employees and other users of this product. For specific intended-use guidance, please refer to the information provided on the package or instruction sheet.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids : Category 3

Eye irritation : Category 2A

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : H226 Flammable liquid and vapour.
H319 Causes serious eye irritation.

Precautionary statements : **Prevention:**
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P280 Wear eye protection/ face protection.
Response:
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
Storage:
P403 + P235 Store in a well-ventilated place. Keep cool.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

Chemical name	CAS-No.	Concentration (%)
Ethyl Alcohol	64-17-5	>= 50 - < 70
Isopropyl Alcohol	67-63-0	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

If inhaled : If inhaled, remove to fresh air.
If symptoms persist, call a physician.

In case of skin contact : Wash with water and soap as a precaution.
Get medical attention if irritation develops and persists.

In case of eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes.
If easy to do, remove contact lens, if worn.

Seek medical advice.

If swallowed	:	If swallowed, DO NOT induce vomiting. Rinse mouth with water. Obtain medical attention.
Most important symptoms and effects, both acute and delayed	:	Causes serious eye irritation.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection and use the recommended protective clothing

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable extinguishing media	:	High volume water jet
Specific hazards during firefighting	:	Do not use a solid water stream as it may scatter and spread fire. Cool closed containers exposed to fire with water spray. Flash back possible over considerable distance. May form explosive mixtures in air. Exposure to decomposition products may be a hazard to health. Carbon oxides
Hazardous combustion products	:	Carbon oxides
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers.
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Material can create slippery conditions.

Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Non-sparking tools should be used. Soak up with inert absorbent material. Suppress (knock down) gases/vapours/mists with a water spray jet. Keep in suitable, closed containers for disposal. Clean contaminated floors and objects thoroughly while observing environmental regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	For personal protection see section 8. Keep away from heat and flame. Use with local exhaust ventilation. Avoid contact with eyes.
Conditions for safe storage	:	Take measures to prevent the build up of electrostatic charge. Keep in properly labelled containers. Keep containers tightly closed in a dry, cool and well-ventilated place. Store in accordance with the particular national regulations.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Ethyl Alcohol	64-17-5	TWA	1,000 ppm 1,900 mg/m3	NIOSH REL
		TWA	1,000 ppm 1,900 mg/m3	OSHA Z-1
		STEL	1,000 ppm	ACGIH
Isopropyl Alcohol	67-63-0	TWA	200 ppm	ACGIH
		STEL	400 ppm	ACGIH
		TWA	400 ppm 980 mg/m3	NIOSH REL
		ST	500 ppm 1,225 mg/m3	NIOSH REL
		TWA	400 ppm 980 mg/m3	OSHA Z-1

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Isopropyl Alcohol	67-63-0	Acetone	Urine	End of	40 mg/l	ACGIH

				shift at end of workweek		BEI

Personal protective equipment

Respiratory protection	:	No personal respiratory protective equipment normally required.
Hand protection Remarks	:	No special protective equipment required.
Eye protection	:	Wear face-shield and protective suit for abnormal processing problems.
Skin and body protection	:	No special measures necessary provided product is used correctly.
Protective measures	:	Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Ensure that eye flushing systems and safety showers are located close to the working place.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Avoid contact with eyes.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	clear, greenish-blue
Odour	:	alcohol-like
Odour Threshold	:	No data available
pH	:	3.8 - 5.2, (20 °C)
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	75.00 °C
Flash point	:	26.50 °C
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	
Upper explosion limit	:	No data available

Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Density	:	0.8742 g/cm3
Solubility(ies) Water solubility	:	soluble
Partition coefficient: n-octanol/water	:	Not applicable
Auto-ignition temperature	:	No data available
Thermal decomposition	:	The substance or mixture is not classified self-reactive.
Viscosity Viscosity, kinematic	:	80 - 600 mm2/s (20 °C)
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Vapours may form explosive mixture with air.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Strong oxidizing agents
Hazardous decomposition products	:	No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Inhalation
Eye contact
Skin contact

Acute toxicity

Not classified based on available information.

Components:

Ethyl Alcohol:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): 124.7 mg/l Exposure time: 4 h Test atmosphere: vapour

Isopropyl Alcohol:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): 72.6 mg/l Exposure time: 4 h Test atmosphere: vapour
Acute dermal toxicity	:	LD50 (Rat): > 5,000 mg/kg

Skin corrosion/irritation

Not classified based on available information.

Components:

Ethyl Alcohol:
Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation

Isopropyl Alcohol:
Species: Rabbit
Result: No skin irritation

Serious eye damage/eye irritation

Causes serious eye irritation.

Components:

Ethyl Alcohol:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days
Method: OECD Test Guideline 405

Isopropyl Alcohol:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days

Respiratory or skin sensitisation

Skin sensitisation: Not classified based on available information.
Respiratory sensitisation: Not classified based on available information.

Components:

Ethyl Alcohol:
Test Type: Local lymph node assay (LLNA)
Exposure routes: Skin contact
Species: Mouse
Result: negative

Isopropyl Alcohol:
Test Type: Buehler Test
Exposure routes: Skin contact

Species: Guinea pig
Method: OECD Test Guideline 406
Result: negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Ethyl Alcohol:

Genotoxicity in vitro	:	Test Type: In vitro mammalian cell gene mutation test Result: negative
Genotoxicity in vivo	:	Test Type: Rodent dominant lethal test (germ cell) (in vivo) Test species: Mouse Application Route: Ingestion Result: negative

Isopropyl Alcohol:

Genotoxicity in vitro	:	Test Type: Bacterial reverse mutation assay (AMES) Result: negative
Genotoxicity in vivo	:	Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Test species: Mouse Application Route: Intraperitoneal injection Result: negative

Carcinogenicity

Not classified based on available information.

Components:

Isopropyl Alcohol:
Species: Rat
Application Route: inhalation (vapour)
Exposure time: 104 weeks
Method: OECD Test Guideline 451
Result: negative

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Components:

Ethyl Alcohol:

Effects on fertility : Test Type: Two-generation reproduction toxicity study
Species: Mouse
Application Route: Ingestion
Method: OECD Test Guideline 416
Result: negative

Isopropyl Alcohol:

Effects on fertility : Test Type: Two-generation reproduction toxicity study
Species: Rat
Application Route: Ingestion
Result: negative

Effects on foetal development : Test Type: Embryo-foetal development
Species: Rat
Application Route: Ingestion
Result: negative

STOT - single exposure

Not classified based on available information.

Components:

Isopropyl Alcohol:

Assessment: May cause drowsiness or dizziness.

STOT - repeated exposure

Not classified based on available information.

Repeated dose toxicity

Components:

Ethyl Alcohol:

Species: Rat
NOAEL: 2,400 mg/kg
Application Route: Ingestion
Exposure time: 2 y

Isopropyl Alcohol:

Species: Rat
NOAEL: 5000 ppm
Application Route: inhalation (vapour)
Exposure time: 104 w
Method: OECD Test Guideline 413

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Ethyl Alcohol:

Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): > 1,000 mg/l

Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 1,000 mg/l
Exposure time: 48 h

Toxicity to algae : EC50 (Chlorella vulgaris (Fresh water algae)): 275 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 9.6 mg/l
Exposure time: 9 d

Toxicity to bacteria : EC50 (Photobacterium phosphoreum): 32.1 mg/l
Exposure time: 0.25 h

Isopropyl Alcohol:
Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): 10,000 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 10,000 mg/l
Exposure time: 24 h

Toxicity to bacteria : EC50 (Pseudomonas putida): > 1,050 mg/l
Exposure time: 16 h

Persistence and degradability

Components:

Ethyl Alcohol:
Biodegradability : Result: Readily biodegradable.
Biodegradation: 84 %
Exposure time: 20 d

Isopropyl Alcohol:
Biodegradability : Result: rapidly degradable

Bioaccumulative potential

Components:

Ethyl Alcohol:
Partition coefficient: n-octanol/water : log Pow: -0.35

Isopropyl Alcohol:
Partition coefficient: n-octanol/water : log Pow: 0.05

Mobility in soil

No data available

Other adverse effects

No data available

Product:

Regulation	40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances
Remarks	This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with local regulations.
Contaminated packaging	:	Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

International Regulation

IATA-DGR

UN/ID No.	:	UN 1987
Proper shipping name	:	Alcohols, n.o.s. (Ethanol, Propan-2-ol)
Class	:	3
Packing group	:	III
Packing instruction (cargo aircraft)	:	366
Packing instruction (passenger aircraft)	:	355

IMDG-Code

UN number	:	UN 1987
Proper shipping name	:	ALCOHOLS, N.O.S. (Ethanol, Propan-2-ol)
Class	:	3
Packing group	:	III
Labels	:	3
EmS Code	:	F-E, S-D
Marine pollutant	:	no

National Regulations

49 CFR

UN/ID/NA number	:	UN 1987
Proper shipping name	:	Alcohols, n.o.s.
Class	:	3
Packing group	:	III
ERG Code	:	127
Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard

SARA 302 : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Isopropyl Alcohol	67-63-0	3.4086 %

Clean Air Act

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 12 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489):

Ethyl Alcohol	64-17-5	65.2821 %
Isopropyl Alcohol	67-63-0	3.4086 %

This product does not contain any VOC exemptions listed under the U.S. Clean Air Act Section 450.

Clean Water Act

This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

US State Regulations

Massachusetts Right To Know

Ethyl Alcohol	64-17-5	50 - 70 %
Isopropyl Alcohol	67-63-0	1 - 5 %

Pennsylvania Right To Know

Ethyl Alcohol	64-17-5	50 - 70 %
Water (Aqua)	7732-18-5	30 - 50 %
Isopropyl Alcohol	67-63-0	1 - 5 %

New Jersey Right To Know

Ethyl Alcohol	64-17-5	50 - 70 %
Water (Aqua)	7732-18-5	30 - 50 %
Isopropyl Alcohol	67-63-0	1 - 5 %

California Prop 65 This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other

reproductive harm.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
AICS	:	On the inventory, or in compliance with the inventory
DSL	:	On the inventory, or in compliance with the inventory
ENCS	:	On the inventory, or in compliance with the inventory
ISHL	:	On the inventory, or in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory

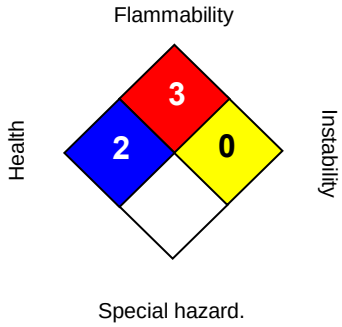
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	2
FLAMMABILITY	3
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date : 01/29/2018

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

Isobutylene

Section 1. Identification

GHS product identifier : Isobutylene

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

SDS # : 001031

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

Product code : 001031

CAS number/other identifiers

CAS number : 115-11-7

Ingredient name	%	CAS number
Isobutylene	100	115-11-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Isobutylene	**ACGIH TLV (United States, 3/2017).** TWA: 250 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Compressed gas.]

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -140.7°C (-221.3°F)

Boiling point : -6.9°C (19.6°F)

Critical temperature : 144.75°C (292.6°F)

Flash point : Closed cup: -76.1°C (-105°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 9.6%

Vapor pressure : 24.3 (psig)

Vapor density : 1.94 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.6845

Gas Density (lb/ft ^{3}) : 0.1496 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.26 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 56.12 g/mole

Aerosol product

Heat of combustion : -45029034 J/kg

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Section 11. Toxicological information

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Isobutylene	2.34	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Section 12. Ecological information

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1055	UN1055	UN1055	UN1055	UN1055
UN proper shipping name	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions 19, T50

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Ship Index Forbidden
Passenger Carrying Road or Rail Index Forbidden
Special provisions 29

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Clean Air Act (CAA) 112 regulated flammable substances: Isobutylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : **Japan inventory (ENCS)**: This material is listed or exempted.
Japan inventory (ISHL): Not determined.

Malaysia : Not determined.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Section 15. Regulatory information

Taiwan : This material is listed or exempted.

Thailand : Not determined.

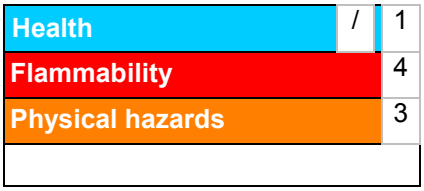
Turkey : Not determined.

United States : This material is listed or exempted.

Viet Nam : Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Liquefied gas	Expert judgment Expert judgment

History

Date of printing : 5/10/2018

Date of issue/Date of revision : 5/10/2018

Date of previous issue : 7/11/2016

Version : 0.02

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973

Section 16. Other information

as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Methanol
Safety Data Sheet
according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations
Date of issue: 07/03/2013 Revision date: 12/12/2017 Supersedes: 12/12/2017 Version: 1.3

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Substance
Substance name : Methanol
CAS-No. : 67-56-1
Product code : VT430
Formula : CH4O
Synonyms : acetone alcohol / alcohol C1 / alcohol, methyl / carbinol / colonial spirits / columbian spirits / green wood spirits / manhattan spirits / methyl alcohol / methyl hydrate / methyl hydroxide / methylen / methylol / monohydroxymethane / pyroligneous spirit / pyroxylic spirit / wood alcohol / wood naphtha

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Solvent

1.3. Details of the supplier of the safety data sheet

Val Tech Diagnostics, A Division of LabChem Inc
Jackson's Pointe Commerce Park Building 1000
1010 Jackson's Pointe Court
Zelienople, PA 16063
T 412-826-5230
F 724-473-0647

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or +1-703-741-5970

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Flam. Liq. 2	H225
Acute Tox. 3 (Oral)	H301
Acute Tox. 3 (Dermal)	H311
Acute Tox. 3 (Inhalation)	H331
STOT SE 1	H370

Full text of H statements : see section 16

2.2. Label elements

GHS US labeling

Hazard pictograms (GHS US) :

GHS02 GHS06 GHS08

Signal word (GHS US) : Danger

Hazard statements (GHS US) :
H225 - Highly flammable liquid and vapour
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H370 - Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral)

Precautionary statements (GHS US) :
P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking.
P233 - Keep container tightly closed.
P240 - Ground/bond container and receiving equipment.
P241 - Use explosion-proof electrical, ventilating, lighting equipment
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P260 - Do not breathe mist, vapors, spray.
P264 - Wash exposed skin thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.

P280 - Wear protective gloves, protective clothing, eye protection, face protection.
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P330 - If swallowed, rinse mouth
P361+P364 - Take off immediately all contaminated clothing and wash it before reuse.
P370+P378 - In case of fire: Use carbon dioxide (CO_2), powder, alcohol-resistant foam to extinguish
P403+P235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 - Dispose of contents/container to comply with local, state and federal regulations

2.3. Other hazards

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Methanol (Main constituent)	(CAS-No.) 67-56-1	100	Flam. Liq. 2, H225 Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation), H331 STOT SE 1, H370

Full text of H-phrases: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with labored breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain.

First-aid measures after inhalation : Remove the victim into fresh air. Immediately consult a doctor/medical service.

First-aid measures after skin contact : Wash immediately with lots of water. Soap may be used. Do not apply (chemical) neutralizing agents. Remove clothing before washing. Consult a doctor/medical service.

First-aid measures after eye contact : Rinse with water. Remove contact lenses, if present and easy to do. Continue rinsing. Take victim to an ophthalmologist if irritation persists.

First-aid measures after ingestion : Rinse mouth with water. Immediately after ingestion, give alcohol to drink. Give nothing to drink. Do not induce vomiting. Immediately consult a doctor/medical service. Take the container/vomit to the doctor/hospital. Call Poison Information Centre (www.big.be/antigif.htm).

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Symptoms similar to those listed under ingestion.

Symptoms/effects after skin contact : Symptoms similar to those listed under ingestion.

Symptoms/effects after eye contact : Redness of the eye tissue. Lacrimation.

Symptoms/effects after ingestion : Nausea. Vomiting. AFTER ABSORPTION OF LARGE QUANTITIES: FOLLOWING SYMPTOMS MAY APPEAR LATER: Change in the blood composition. Headache. Feeling of weakness. Abdominal pain. Muscular pain. Central nervous system depression. Dizziness. Mental confusion. Drunkenness. Coordination disorders. Disturbed motor response. Disturbances of consciousness. Visual disturbances. Blindness. Respiratory difficulties. Cramps/uncontrolled muscular contractions.

Chronic symptoms : Red skin. Dry skin. Skin rash/inflammation. Headache. Disturbed tactile sensibility. Visual disturbances. Sleeplessness. Gastrointestinal complaints. Cardiac and blood circulation effects.

4.3. Indication of any immediate medical attention and special treatment needed

Immediately after ingestion, give a glass of strong drink, beer or wine to drink. Hospitalize at once for treatment with the right antidotes.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Quick-acting ABC powder extinguisher. Quick-acting BC powder extinguisher. Quick-acting class B foam extinguisher. Quick-acting CO2 extinguisher. Class B foam (alcohol-resistant). Water spray if puddle cannot expand.

Unsuitable extinguishing media : Water (quick-acting extinguisher, reel); risk of puddle expansion. Water; risk of puddle expansion.

5.2. Special hazards arising from the substance or mixture

Fire hazard : DIRECT FIRE HAZARD. Highly flammable liquid and vapour. Gas/vapor flammable with air within explosion limits. INDIRECT FIRE HAZARD. May be ignited by sparks.

Explosion hazard : DIRECT EXPLOSION HAZARD. Gas/vapour explosive with air within explosion limits. INDIRECT EXPLOSION HAZARD. may be ignited by sparks. Reactions with explosion hazards: see "Reactivity Hazard".

Reactivity : Violent to explosive reaction with (some) metal powders and with (strong) oxidizers. Violent exothermic reaction with (some) acids and with (some) halogens compounds.

5.3. Advice for firefighters

Firefighting instructions : Cool tanks/drums with water spray/remove them into safety. Do not move the load if exposed to heat. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : No flames, no sparks. Eliminate all sources of ignition. No naked lights. No smoking. Dike and contain spill.

6.1.1. For non-emergency personnel

Protective equipment : Gas-tight suit.

Emergency procedures : Keep upwind. Mark the danger area. Consider evacuation. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosion-proof appliances and lighting equipment. Keep containers closed. Wash contaminated clothes.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Stop leak if safe to do so. Ventilate area.

6.2. Environmental precautions

Prevent soil and water pollution. Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

For containment : Contain released substance, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Try to reduce evaporation. Measure the concentration of the explosive gas-air mixture. Dilute combustible/toxic gases/vapours with water spray. Take account of toxic/corrosive precipitation water. Provide equipment/receptacles with earthing. Do not use compressed air for pumping over spills.

Methods for cleaning up : Take up liquid spill into a non combustible material e.g.: sand, earth, vermiculite slaked lime or soda ash. Scoop absorbed substance into closing containers. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the concentration in the air regularly. Work under local exhaust/ventilation. Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Handle uncleaned empty containers as full ones. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Do not use compressed air for pumping over. Keep container tightly closed.

Hygiene measures : Do not eat, drink or smoke when using this product. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

Incompatible products : Strong oxidizers. Strong bases. Strong acids. Acid anhydrides. Acid chlorides.

Incompatible materials : Direct sunlight. Heat sources. Sources of ignition.

Heat-ignition : KEEP SUBSTANCE AWAY FROM: heat sources. ignition sources.

Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: combustible materials. oxidizing agents. strong acids. (strong) bases. halogens. amines. water/moisture.

Storage area : Store in a cool area. Store in a dry area. Keep container in a well-ventilated place. Fireproof storeroom. Keep locked up. Provide for a tub to collect spills. Provide the tank with earthing. Unauthorized persons are not admitted. Aboveground. Meet the legal requirements.

Special rules on packaging : SPECIAL REQUIREMENTS: closing. dry. clean. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.

Packaging materials : SUITABLE MATERIAL: steel. stainless steel. iron. glass. MATERIAL TO AVOID: lead. aluminium. zinc. polyethylene. PVC.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Methanol (67-56-1)		
USA ACGIH	ACGIH TWA (ppm)	200 ppm
USA ACGIH	ACGIH STEL (ppm)	250 ppm

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure. Keep concentrations well below lower explosion limits.

Personal protective equipment : Safety glasses. Protective clothing. Gloves. Full protective flameproof clothing. Face shield.

Materials for protective clothing : GIVE GOOD RESISTANCE: polyethylene/ethylenevinylalcohol. styrene-butadiene rubber. viton. GIVE LESS RESISTANCE: chloroprene rubber. chlorinated polyethylene. natural rubber. nitrile rubber/PVC. GIVE POOR RESISTANCE: leather. neoprene. nitrile rubber. polyethylene. PVA. PVC. polyurethane.

Hand protection : Protective gloves against chemicals (EN374).

Eye protection : Safety glasses.

Skin and body protection : Head/neck protection. Protective clothing.

Respiratory protection : Full face mask with filter type AX at conc. in air > exposure limit. High vapour/gas concentration: self-contained respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Liquid

Appearance : Liquid.

Molecular mass : 32.04 g/mol

Color : Colourless.

Odor	:	Characteristic odour. Mild odour. Pleasant odour. Alcohol odour. Commercial/unpurified substance: irritating/pungent odour.
Odor threshold	:	No data available
pH	:	No data available
Relative evaporation rate (butyl acetate=1)	:	4.1
Relative evaporation rate (ether=1)	:	6.3
Melting point	:	-97.8 °C
Freezing point	:	No data available
Boiling point	:	64.7 °C (1013 hPa)
Flash point	:	9.7 °C (Closed cup, 1013 hPa, EU Method A.9: Flash-Point)
Critical temperature	:	240 °C
Auto-ignition temperature	:	455 °C (1013 hPa, DIN 51794: Self-ignition temperature)
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapor pressure	:	128 hPa (20 °C)
Vapor pressure at 50 °C	:	552 hPa
Critical pressure	:	79547 hPa
Relative vapor density at 20 °C	:	1.1
Relative density	:	0.79 - 0.80 (20 °C)
Relative density of saturated gas/air mixture	:	1
Specific gravity / density	:	790 - 800 kg/m³ (20 °C)
Solubility	:	Soluble in water. Soluble in ethanol. Soluble in ether. Soluble in acetone. Soluble in chloroform. Water: 100 g/100ml (20 °C) Ethanol: complete Ether: complete Acetone: complete
Log Pow	:	-0.77 (Experimental value)
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	0.544 - 0.59 mPa·s (25 °C)
Explosive properties	:	No data available
Oxidizing properties	:	No data available
Explosion limits	:	5.5 - 36.5 vol %

9.2. Other information

Minimum ignition energy	:	0.14 mJ
Saturation concentration	:	166 g/m³
VOC content	:	100 %
Other properties	:	Clear. Hygroscopic. Volatile. Neutral reaction.

SECTION 10: Stability and reactivity

10.1. Reactivity

Violent to explosive reaction with (some) metal powders and with (strong) oxidizers. Violent exothermic reaction with (some) acids and with (some) halogens compounds.

10.2. Chemical stability

Hygroscopic.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Direct sunlight. High temperature. Incompatible materials. Open flame. Sparks. Overheating.

10.5. Incompatible materials

Strong oxidizers. Strong bases. Strong acids. Peroxides. Acid anhydrides. Acid chlorides.

10.6. Hazardous decomposition products

Carbon dioxide. Carbon monoxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Methanol (\f)67-56-1	
LD50 oral rat	1187 - 2769 mg/kg body weight (BASF test, Rat, Male / female, Weight of evidence, Aqueous solution, Oral, 7 day(s))
LD50 dermal rabbit	17100 mg/kg (Rabbit, Inconclusive, insufficient data, Dermal)
LC50 inhalation rat (mg/l)	128.2 mg/l air (BASF test, 4 h, Rat, Male / female, Experimental value, Inhalation (vapours))
ATE CLP (oral)	100 mg/kg body weight
ATE CLP (dermal)	300 mg/kg body weight
ATE CLP (gases)	700 ppmV/4h
ATE CLP (vapors)	3 mg/l/4h
ATE CLP (dust, mist)	0.5 mg/l/4h

Skin corrosion/irritation : Not classified

Serious eye damage/irritation : Not classified

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral).

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Toxic in contact with skin. Toxic if swallowed. Toxic if inhaled.

Symptoms/effects after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Symptoms similar to those listed under ingestion.

Symptoms/effects after skin contact : Symptoms similar to those listed under ingestion.

Symptoms/effects after eye contact : Redness of the eye tissue. Lacrimation.

Symptoms/effects after ingestion : Nausea. Vomiting. AFTER ABSORPTION OF LARGE QUANTITIES: FOLLOWING SYMPTOMS MAY APPEAR LATER: Change in the blood composition. Headache. Feeling of weakness. Abdominal pain. Muscular pain. Central nervous system depression. Dizziness. Mental confusion. Drunkenness. Coordination disorders. Disturbed motor response. Disturbances of consciousness. Visual disturbances. Blindness. Respiratory difficulties. Cramps/uncontrolled muscular contractions.

Chronic symptoms : Red skin. Dry skin. Skin rash/inflammation. Headache. Disturbed tactile sensibility. Visual disturbances. Sleeplessness. Gastrointestinal complaints. Cardiac and blood circulation effects.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008.

Ecology - air : Not included in the list of substances which may contribute to the greenhouse effect (IPCC). Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014). Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009).

Ecology - water : Not harmful to crustacea. Not harmful to fishes. Groundwater pollutant. Inhibition of activated sludge. Nitrification of activated sludge is inhibited. Not harmful to algae. Not harmful to bacteria.

Methanol (67-56-1)	
LC50 fish 1	15400 mg/l (EPA 660/3 - 75/009, 96 h, Lepomis macrochirus, Flow-through system, Fresh water, Experimental value, Lethal)
EC50 Daphnia 1	18260 mg/l (OECD 202: Daphnia sp. Acute Immobilisation Test, 96 h, Daphnia magna, Semi-static system, Fresh water, Experimental value, Locomotor effect)
ErC50 (algae)	22000 mg/l (OECD 201: Alga, Growth Inhibition Test, 96 h, Pseudokirchneriella subcapitata, Static system, Fresh water, Experimental value)

12.2. Persistence and degradability

Methanol (67-56-1)	
Persistence and degradability	Readily biodegradable in the soil. Readily biodegradable in water.
Biochemical oxygen demand (BOD)	0.6 - 1.12 g O □/g substance
Chemical oxygen demand (COD)	1.42 g O □/g substance
ThOD	1.5 g O □/g substance

12.3. Bioaccumulative potential

Methanol (67-56-1)	
BCF fish 1	1 - 4.5 (72 h, Cyprinus carpio, Static system, Fresh water, Experimental value)
Log Pow	-0.77 (Experimental value)
Bioaccumulative potential	Low potential for bioaccumulation (BCF < 500).

12.4. Mobility in soil

Methanol (67-56-1)	
Surface tension	0.023 N/m (20 °C)
Log Koc	0.088 (log Koc, SRC PCKOCWIN v2.0, Calculated value)
Ecology - soil	Highly mobile in soil.

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Do not discharge into drains or the environment. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle by distillation. Incinerate under surveillance with energy recovery. Obtain the consent of pollution control authorities before discharging to wastewater treatment plants.

Additional information : Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN1230 Methanol, 3, II

UN-No.(DOT) : 1230

DOT NA no. : UN1230

Proper Shipping Name (DOT) : Methanol

Transport hazard class(es) (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

Hazard labels (DOT) : 3 - Flammable liquid

DOT Symbols : D - Proper shipping name for domestic use only, or to and from Canada

Packing group (DOT) : II - Medium Danger

DOT Special Provisions (49 CFR 172.102)	:	IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized. T7 - 4 178.274(d)(2) Normal..... 178.275(d)(3) TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.
DOT Packaging Exceptions (49 CFR 173.xxx)	:	150
DOT Packaging Non Bulk (49 CFR 173.xxx)	:	202
DOT Packaging Bulk (49 CFR 173.xxx)	:	242
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	1 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	60 L
DOT Vessel Stowage Location	:	B - (i) The material may be stowed ‘‘on deck’’ or ‘‘under deck’’ on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) ‘‘On deck only’’ on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.
DOT Vessel Stowage Other	:	40 - Stow ‘‘clear of living quarters’’
Marine pollutant	:	-

Additional information

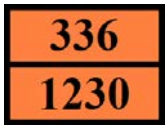
Other information : No supplementary information available.

ADR

Transport document description :

Hazard identification number (Kemler No.) : 336

Orange plates :



Tunnel restriction code : D/E

Transport by sea

UN-No. (IMDG)	:	1230
Proper Shipping Name (IMDG)	:	methanol
Class (IMDG)	:	3 - Flammable liquids
Packing group (IMDG)	:	II - substances presenting medium danger
EmS-No. (1)	:	F-E
MFAG-No	:	19
EmS-No. (2)	:	S-D

Air transport

UN-No. (IATA)	:	1230
Proper Shipping Name (IATA)	:	Methanol
Class (IATA)	:	3 - Flammable Liquids
Packing group (IATA)	:	II - Medium Danger

SECTION 15: Regulatory information

15.1. US Federal regulations

Methanol (67-56-1)

Listed on the United States TSCA (Toxic Substances Control Act) inventory
Subject to reporting requirements of United States SARA Section 313

Methanol (67-56-1)	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 311/312 Hazard Classes	Physical hazard - Flammable (gases, aerosols, liquids, or solids) Health hazard - Acute toxicity (any route of exposure) Health hazard - Specific target organ toxicity (single or repeated exposure)

15.2. International regulations

CANADA

Methanol (67-56-1)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class B Division 2 - Flammable Liquid Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Liq. 2	H225
Acute Tox. 3 (Inhalation)	H331
Acute Tox. 3 (Dermal)	H311
Acute Tox. 3 (Oral)	H301
STOT SE 1	H370

Full text of H statements : see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Not classified

15.2.2. National regulations

No additional information available

15.3. US State regulations

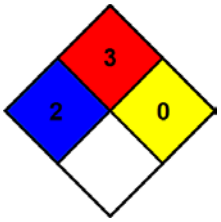
Methanol(67-56-1)	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No

SECTION 16: Other information

Full text of H-phrases: see section 16:

H225	Highly flammable liquid and vapour
H301	Toxic if swallowed
H311	Toxic in contact with skin
H331	Toxic if inhaled
H370	Causes damage to organs

NFPA health hazard	:	2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.
NFPA fire hazard	:	3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.
NFPA reactivity	:	0 - Material that in themselves are normally stable, even under fire conditions.



Hazard Rating

Health	:	2 Moderate Hazard - Temporary or minor injury may occur
Flammability	:	3 Serious Hazard
Physical	:	0 Minimal Hazard
Personal protection	:	H

SDS US ValTech

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.

SAFETY DATA SHEET

Nitric Acid

Version	Revision Date:	SDS Number:	Date of last issue: 10/11/2018
4.1	04/05/2019	1334196-00034	Date of first issue: 02/27/2017

SECTION 1. IDENTIFICATION

Product name : Nitric Acid

SDS-Identcode : 130000036514

Manufacturer or supplier's details

Company name of supplier : First Chemical Corporation

Address : 1001 Industrial Road
Pascagoula, MS 39581 United States of America (USA)

Telephone : +1-228-762-0870

Emergency telephone : Medical emergency: 1-866-595-1473 (outside the U.S. 1-302-773-2000) ; Transport emergency: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

Recommended use of the chemical and restrictions on use

Recommended use : Intermediate

Restrictions on use : For industrial use only.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Corrosive to Metals : Category 1

Acute toxicity (Inhalation) : Category 3

Skin corrosion : Category 1A

Serious eye damage : Category 1

GHS label elements

Hazard pictograms :

Signal Word : Danger

Hazard Statements : H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.

Precautionary Statements : **Prevention:**

P234 Keep only in original container.
P261 Avoid breathing mist or vapors.

P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P301 + P330 + P331 + P310 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER/doctor.
P303 + P361 + P353 + P310 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a POISON CENTER/doctor.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P363 Wash contaminated clothing before reuse.
P390 Absorb spillage to prevent material damage.

Storage:

P405 Store locked up.
P406 Store in corrosive resistant container with a resistant inner liner.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

Corrosive to the respiratory tract.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Components

Chemical name	CAS-No.	Concentration (% w/w)
Nitric acid	7697-37-2	>= 65 - < 70

Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

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

Get medical attention immediately.

In case of skin contact	:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
In case of eye contact	:	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lens, if worn. Get medical attention immediately.
If swallowed	:	If swallowed, DO NOT induce vomiting. If vomiting occurs have person lean forward. Call a physician or poison control center immediately. Rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed	:	Causes serious eye damage. Toxic if inhaled. Causes severe burns. Causes digestive tract burns. Corrosive to respiratory system.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists.
Notes to physician	:	Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water spray Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical
Unsuitable extinguishing media	:	None known.
Specific hazards during fire fighting	:	Exposure to combustion products may be a hazard to health.
Hazardous combustion products	:	Nitrogen oxides (NOx)
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.

Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Follow safe handling advice and personal protective equipment recommendations.
Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g., by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Soak up with inert absorbent material. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	Use with local exhaust ventilation.
Advice on safe handling	:	Do not get on skin or clothing. Do not breathe vapors or spray mist. Do not swallow. Do not get in eyes. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Keep container tightly closed. Keep away from metals. Store in original container or corrosive resistant and/or lined container. Take care to prevent spills, waste and minimize release to the environment.
Conditions for safe storage	:	Keep in properly labeled containers.

Store in original container.
Store locked up.
Keep tightly closed.
Keep in a cool, well-ventilated place.
Store in accordance with the particular national regulations.
Reacts with many metals to liberate hydrogen gas which can form explosive mixtures with air. Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage.

Materials to avoid : Do not store with the following product types:
Strong oxidizing agents
Organic peroxides
Explosives
Gases

Recommended storage temperature : 100.0 °F / 37.8 °C

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Nitric acid	7697-37-2	TWA	2 ppm	ACGIH
		STEL	4 ppm	ACGIH
		ST	4 ppm 10 mg/m³	NIOSH REL
		TWA	2 ppm 5 mg/m³	NIOSH REL
		TWA	2 ppm 5 mg/m³	OSHA Z-1

Engineering measures : Minimize workplace exposure concentrations.
Use with local exhaust ventilation.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection

Material	:	Chemical-resistant gloves
Remarks	:	Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. Breakthrough time is not determined for the product. Change gloves often! For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday.
Eye protection	:	Wear the following personal protective equipment: Chemical resistant goggles must be worn. If splashes are likely to occur, wear: Face-shield
Skin and body protection	:	Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential. Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).
Hygiene measures	:	Ensure that eye flushing systems and safety showers are located close to the working place. When using do not eat, drink or smoke. Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Color	:	colorless, light yellow
Odor	:	odorless
Odor Threshold	:	No data available
pH	:	0.75
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	248 °F / 120 °C
Flash point	:	does not flash
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	No data available

Self-ignition	:	The substance or mixture is not classified as pyrophoric.
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	65.3 - 73.3 hPa (77 °F / 25 °C)
Relative vapor density	:	1.4
Relative density	:	No data available
Solubility(ies)		
Water solubility	:	completely soluble
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity		
Viscosity, kinematic	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Metal corrosion rate	:	Corrosive to metals
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Can react with strong oxidizing agents. May be corrosive to metals.
Conditions to avoid	:	None known.
Incompatible materials	:	Oxidizing agents Bases
Hazardous decomposition products	:	No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity

Toxic if inhaled.

Product:

Acute inhalation toxicity	:	Acute toxicity estimate: 4.62 mg/l Exposure time: 4 h Test atmosphere: vapor Method: Calculation method

Components:

Nitric acid:

Acute inhalation toxicity	:	LC50 (Rat): > 2.65 mg/l Exposure time: 4 h Test atmosphere: vapor Method: OECD Test Guideline 403 Assessment: Corrosive to the respiratory tract.

Skin corrosion/irritation

Causes severe burns.

Components:

Nitric acid:

Result	:	Corrosive after 3 minutes or less of exposure
Remarks	:	Based on harmonised classification in EU regulation 1272/2008, Annex VI

Serious eye damage/eye irritation

Causes serious eye damage.

Components:

Nitric acid:

Result	:	Irreversible effects on the eye
Remarks	:	Based on skin corrosivity.

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Germ cell mutagenicity

Not classified based on available information.

Components:

Nitric acid:

Genotoxicity in vitro	:	Test Type: Bacterial reverse mutation assay (AMES) Result: negative
Genotoxicity in vivo	:	Test Type: Unscheduled DNA synthesis test (UDS) in testicular cells Species: Mouse Application Route: Ingestion Result: negative Remarks: Based on data from similar materials

Carcinogenicity

Not classified based on available information.

Components:

Nitric acid:

Species	:	Rat
Application Route	:	Ingestion
Exposure time	:	273 days
Result	:	negative
Remarks	:	Based on data from similar materials

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Components:

Nitric acid:

Effects on fertility	:	Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test Species: Rat Application Route: Ingestion Method: OECD Test Guideline 422 Result: negative Remarks: Based on data from similar materials
Effects on fetal development	:	Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test Species: Rat Application Route: Ingestion

Method: OECD Test Guideline 422
Result: negative
Remarks: Based on data from similar materials

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Not classified based on available information.

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Nitric acid:

Toxicity to fish	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 6,000 mg/l Exposure time: 96 h Remarks: Based on data from similar materials
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 8,609 mg/l Exposure time: 48 h Remarks: Based on data from similar materials
Toxicity to fish (Chronic toxicity)	:	NOEC: 97.8 mg/l Exposure time: 3 Months Remarks: Based on data from similar materials
Toxicity to microorganisms	:	EC50: > 1,000 mg/l Exposure time: 3 h Remarks: Based on data from similar materials

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with local regulations.
Contaminated packaging	:	Empty containers should be taken to an approved waste

handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number	:	UN 2031
Proper shipping name	:	NITRIC ACID
Class	:	8
Packing group	:	II
Labels	:	8

IATA-DGR

UN/ID No.	:	UN 2031
Proper shipping name	:	Nitric acid
Class	:	8
Packing group	:	II
Labels	:	Corrosive
Packing instruction (cargo aircraft)	:	855
Packing instruction (passenger aircraft)	:	Not permitted for transport

IMDG-Code

UN number	:	UN 2031
Proper shipping name	:	NITRIC ACID
Class	:	8
Packing group	:	II
Labels	:	8
EmS Code	:	F-A, S-B
Marine pollutant	:	no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number	:	UN 2031
Proper shipping name	:	Nitric acid
Class	:	8
Packing group	:	II
Labels	:	CORROSIVE
ERG Code	:	157
Marine pollutant	:	no

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Nitric acid	7697-37-2	1000	1538

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Nitric acid	7697-37-2	1000	1538

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

Components	CAS-No.	Component TPQ (lbs)
Nitric acid	7697-37-2	1000

SARA 311/312 Hazards : Corrosive to Metals
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Nitric acid 7697-37-2 >= 50 - < 70 %

US State Regulations

Pennsylvania Right To Know

Nitric acid 7697-37-2
Water 7732-18-5

California List of Hazardous Substances

Nitric acid 7697-37-2

California Permissible Exposure Limits for Chemical Contaminants

Nitric acid 7697-37-2

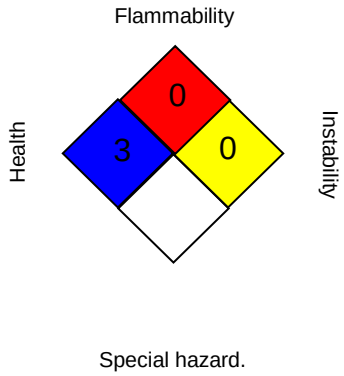
California List of Acutely Hazardous Chemicals, Toxics and Reactives

Nitric acid 7697-37-2

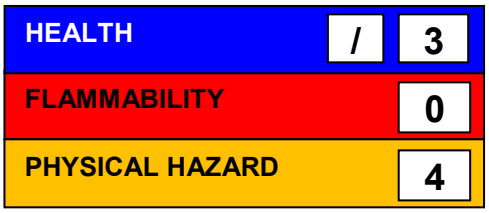
SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



HMIS® IV:



HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

Before use read Chemours safety information.
For further information contact the local Chemours office or nominated distributors.
All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / TWA	:	8-hour, time-weighted average
ACGIH / STEL	:	Short-term exposure limit
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
OSHA Z-1 / TWA	:	8-hour time weighted average

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health

Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	04/05/2019

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

US / Z8

1 IDENTIFICATION OF THE PREPARATION AND COMPANY

Product Name:	Sawyer Permethrin Insect Repellent(s): Clothing & Gear
EPA Reg. No.:	50404-3-58188
Product Code(s):	SP649, SP657, SP647, SP652, SP653, PH647, RB648
Application:	Pump / Liquid Insecticide/Repellent for use on clothing
Supplier:	Sawyer Products, Inc. 605 7th Avenue North P.O. Box 188 Safety Harbor, FL 34695
E-mail:	feedback@sawyer.com
Website:	http://sawyer.com
Telephone Number:	800-356-7811 (M-F, 9-5, EST)

2 HAZARD IDENTIFICATION

Classification of Preparation:	None.
Primary Hazards:	R50/53: Very toxic to aquatic organisms, may cause long-term adverse affects in the aquatic environment.

3 COMPOSITION / INFORMATION ON INGREDIENTS

Product Description: Dangerous preparation according to EU directive 1999/45EC:
Information of Hazardous Substances:

Substance Name	Concentration	CAS Number	EC Number	Symbols	R-Phrases
Permethrin	0.50%w/w	52645-53-1	258-067-9	Xn, R50/53	R22

Reference is made to Chapter 16 for full test of each relevant R phrase. Occupational exposure limit(s), if relevant, are listed in Section 8.

4 FIRST-AID MEASURES

Any Special Measure:	None.
First Aid Measures –	
If Swallowed:	Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
If Inhaled:	Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for treatment advice.
Skin Contact:	Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.
If In Eyes:	Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

5 FIRE-FIGHTING MEASURES

Extinguishing Media –

Suitable: Carbon dioxide (CO_2), Dry chemical, Foam, Water

Not Suitable: As appropriate for surrounding fire.

Special Exposure Hazards: None known.

Hazardous Thermal Decomposition Products: None.

Special Protective Equipment for Firefighters: Use adequate respiratory equipment in case of insufficient ventilation.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions:	Avoid contact with face, eyes, or skin. Avoid breathing vapors or spray mist. Harmful if swallowed. Wash thoroughly after handling and before eating or smoking. Do not use on humans.
Environmental Precautions:	This product is extremely toxic to fish and other aquatic organisms. Do not apply directly to water. Do not contaminate water when disposing of equipment washwaters. Large Spills: Contain with a dike.
Methods for Clean-up:	Absorb residues in sand or other inert material. Collect spilled material in containers. Call your local solid waste agency for disposal instructions.
Other Information:	Notify Authorities if any exposure to the general public or the environment occurs or is likely to occur.

7 HANDLING AND STORAGE

Handling:	Handle in accordance with good occupational hygiene and safety practices in well-ventilated areas.
Storage:	Keep in a cool, dry and well-ventilated place (< 95°F)(< 35°C). Do not store where temperature falls below (32°F)(0°C). Protect from sunlight. Keep away from food, drink and animal feedstuff.
Recommended Packaging:	Keep only in the original packaging.
Use:	Use insecticides safely. Always read the label and product information before use.

8 EXPOSURE CONTROL/PERSONAL PROTECTION

Engineering Measure: Use only in well-ventilated areas. Comply with standard precautionary measures for working with chemicals.
Hygienic Measures: When using do not eat, drink or smoke.
Occupational Exposure Limits: Occupational exposure limits have not been established for this product.
Workplace exposure limits (mg/m³): Not determined for this product.
Personal Protective Equipment: Exposure limits: non-assigned. As a consumer use product there is no requirement for personal protection.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Liquid
Color:	Milky white
Odor:	Slight (Characteristic)
pH:	6.0 – 7.0
Flash Point (TCC):	>200°F (>93°C)
Specific Gravity:	0.995
Pounds/Gallon:	8.31
Solubility (Oil):	Negligible
Solubility (Water):	Miscible
Shelf Life:	5-years

10 STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to avoid: Do not store when Temperature exceeds (< 95°F)(< 35°C) or falls below (32°F)(0°C).
Materials to avoid: None.
Hazardous Decomposition Products: No known.
Reactivity: None.

11 TOXICOLOGICAL INFORMATION

Symptoms of Overexposure for Each Potential Route of Exposure:

Inhaled: None.
Contact with skin or eyes: None.
Absorbed through skin: None.
Swallowed: None.
Health effects or risk from exposure: Acute: *None established* Chronic: *None established*

12 ECOLOGICAL INFORMATION*

No Ecotoxicological research has been carried out on this product.

Eco Toxicity:	LD50 quail >675g/kg, LC50 96hr fish (Guppy) = 0.38mg/l, EC50 48hr daphnia = 0.0085mg/l, EC50 72hr algae = 25mg/l.
Mobility:	Not specified.
Persistence – degradability:	Data given in this section are for the active ingredient: Soil DT50<28 days. Water DT50 6 TO 24 HOURS (ponds & streams), 7 Days (pond sediment).
Bioaccumulative potential:	Not specified.

**Extrapolated from Technical Concentrate*

13 DISPOSAL CONSIDERATION

Product residues:	Replace cap, wrap clean, empty container in several layers of newspaper, and discard container in rubbish. Containers may be recycled. Treat product residues and non-empty pack as hazardous waste.
Additional warning:	None.

14 TRANSPORT INFORMATION

This preparation is not classified as a Dangerous Goods for Transport.

Proper Shipping Name:	Insect Repellent/Clothing Treatment
	Not Restricted.

15 REGULATORY INFORMATION

TSCA (Toxic Substances Control Act) Regulations, 40CFR710: This preparation is a pesticide and is exempt from TSCA regulation.

CERCLA and SARA Regulations (40CFR355, 370, 372): this preparation does not contain any chemicals subject to the reporting requirements of SARA Sec. 313.

This preparation is classified and labelled in accordance with the Control of Pesticides Regulations (1986) and EU DIRECTIVE 1999/45/EC.


DANGEROUS FOR THE ENVIRONMENT

R50/53: Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.
S29: Do not empty into drains.

To avoid risks to man and the environment, comply with the instructions for use.

16 OTHER INFORMATION

Prepared in accordance with OSHA Hazard Communication Standard (HCS) to conform to the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

The information in this safety data sheet is compiled in compliance with Regulation (EC) 1907/2006.

This product is intended for consumer (amateur) use only.

The information given in this safety data sheet is correct to the best of our knowledge at the date of issue. It is intended as a guide for the safe use, handling, disposal, storage and transportation and is not intended as warranty or as a specification. Recipients of our products must take responsibility for observing the law and regulations. The information relates only to the product supplied and may not be suitable for use with other product materials other than those described within.

Sawyer Products, Inc. disclaims any liability for loss or damage resulting from the use of this data, information suggestions.

Appendix D

Forms

Follow the GEI incident reporting procedures and send the completed form to: SafetyTeam@GEIConsulants.com.

Accident/Incident Report Form

SECTION A ACCIDENT/INCIDENT DETAILS

EMPLOYEE INFORMATION:

Name: _____

Home Address: _____
Street Address City State Zip Code

Contact Information: ( ) ( )
Primary Secondary

Date of Birth: _____

Date of Hire: _____

Branch: _____

Supervisor: _____

OTHER INJURED (IF APPLICABLE):

Name: _____

Home Address: _____
Street Address City State Zip Code

Contact Information: ( ) ( )
Primary Secondary

Date of Birth: _____

Date of Hire: _____

Branch: _____

Supervisor: _____

Date and Time Accident/Incident	Date and Time Reported
____/____/____ Month Day Year	____/____/____ Month Day Year
____ A.M. ____ P.M.	____ A.M. ____ P.M.

LOCATION OF INCIDENT/ACCIDENT

Project Name: _____

Client and Location: _____

or _____

Office Location: _____

INCIDENT TYPE: (Check All That Applies)

- ☐ **Personal Injury/Illness**
- ☐ **Vehicle Accident**
- ☐ **Property Damage**
- ☐ **Environmental Spill**
- ☐ **Other**

WITNESS INFORMATION

Name: _____

Contact Number: _____

Company: _____

WHAT HAPPENED TO THE INJURED PARTY: ☐First Aid Administered ☐Refused Treatment/Transport ☐Transported to Hospital ☐Returned to Work ☐ Went Home ☐ Went to Physician ☐ Unknown

Clinic/Hospital or Treating Physician: _____ Phone: _____
Name Street Address City State Zip Code

SECTION B PERSONAL INJURY

Cause of Injury: _____

Part of Body Injured: _____ Multiple Injuries: ☐Y ☐N

Was PPE worn when injured? : ☐Y ☐N What PPE was worn? _____

WAS INJURY A RESULT OF THE USE A MOTOR VEHICLE: ☐ **YES** ☐ **NO** **(If yes, complete Section C)**

Follow the GEI incident reporting procedures and send the completed form to: SafetyTeam@GEIConsulants.com.

Accident/Incident Report Form

SECTION C — AUTO ACCIDENT ONLY

DRIVER/VEHICLE INFORMATION

Name of Insured: _____

Department: _____

Driver's License Number: _____

DOB: ____/____/____ State: _____

Description of Vehicle: License Plate Number: _____

Make: _____ Model: _____ Year:_____ Color:_____

Owner: _____

Name of Other Driver: _____

Driver's License Number: _____

State: _____

Description of Vehicle: License Plate Number: _____

Make: _____ Model:_____ Year:_____ Color:_____

Insurance Carrier: _____

Policy Number: _____Ph. Number:_____

SECTION D — PROPERTY DAMAGE OR CHEMICAL RELEASE ONLY

Type of Damage(s): _____

Cause of Damage(s): _____

Type of Chemical Released (if known): _____

Quantity of Chemical Released: _____

Spill Measures Employed: _____

SECTION E — NATURE OF ACCIDENT/INCIDENT AND EXTENT OF INJURIES/DAMAGES

(Please give a detailed description of what happened. Attach a sketch or picture if applicable)

_____

_____

_____

_____

_____

_____

_____

_____

_____

I hereby certify that the above information is true and correct to my understanding of this accident/incident.

_____ _____

Employee/Preparer's Name **Date and Time**

Follow the GEI incident reporting procedures and send the completed form to: SafetyTeam@GEIConsulants.com.

Near Miss Report Form

NEAR MISS DETAILS

Employee Name: _____

Phone Number: _____

Branch: _____

Supervisor: _____

Date and Time Accident/Incident	Date and Time Reported	LOCATION OF NEAR MISS
____/____/____ Month Day Year ____A.M. ____P.M.	____/____/____ Month Day Year ____A.M. ____P.M.	**Project Name:** _____ **Client and Location:** _____ **or** _____ **Office Location:** _____

WHAT HAPPENED?

(Please give a detailed description of what happened. Attach photos or a sketch, if applicable.)

☐ **Photos were Taken**

WHAT WAS DONE?

(Please give a detailed description of what was done to prevent and incident from occurring.)

☐ **I have verbally contacted a member of the Safety Team and my Supervisor.**

Employee/Preparer's Name _____ **Date and Time** _____

Project Safety Briefing Form

Project Number:	**Project Name:**
Date:	**Time:**
Briefing Conducted by:	**Signature:**

This sign-in log documents that a project specific-briefing was conducted in accordance with the site-specific HASP and GEI's H&S policy. GEI personnel who perform work on site are required to attend this project briefing. Applicable health and safety SOPs and any additional hazards are also required to be reviewed during this briefing. Prior to the start of the project or upon the start of a new on-site project team member, this form must be completed. Please email this completed form to:

SafetyTeam@geiconsultants.com

TOPICS COVERED (check all those covered):

SOP HS-001 Biological Hazards		SOP HS-025 Manual Lifting	
SOP HS-002 Bloodborne Pathogens		SOP HS -26 Hazard Identification	
SOP HS-003 Container Management		SOP HS-27 Confined Space Entry for Sanitary Sewers	
SOP HS-004 Driver Safety		SOP HS-28 Safe Trailer Use	
SOP HS-005a Electrical Safety		SOP HS-29 Overtime and Fatigue Management	
SOP HS-005b Lockout/Tagout		Accident Reporting Procedures	
SOP HS-006 Excavation/Trenching		Changes to the HASP	
SOP HS-008a Hand Tools (Non-Powered)		Cold Stress	
SOP HS-008b Powered Hand Tools		Confined Space	
SOP HS-009 Hazardous Substances Management		Decon Procedures	
SOP HS-010 Inclement Weather		Exposure Guidelines	
SOP HS-011 Ladders		General PPE Usage	
SOP HS-012 Noise Exposure		Heat Stress	
SOP HS-013 Nuclear Density Gauge		Hearing Conservation	
SOP HS-014 Utility Markout		Lockout/Tagout	
SOP HS-015 Respirator Fit Test		Personal Hygiene	
SOP HS-016 Traffic Hazards		Respiratory Protection	
SOP HS-017 Water Safety		Review of Hazard Evaluation	
SOP HS-018 Working Around Heavy Equipment		Site Control	
SOP HS-019 Rail Safety		Site Emergency Procedures	
SOP HS-020 Aerial Lift		Slips, Trips, Falls	
SOP HS-021 Mobile Equipment		Other (Specify):	
SOP HS-022 Aquatic Ecological Survey/Electrofishing		Other (Specify):	
SOP HS-023 Scaffolding		Other (Specify):	
SOP HS-024 Wilderness Safety		Other (Specify):	

Personnel Sign-in List

Printed Name	**Signature**

GEI Consultants

Daily Safety Briefing and Site Visitor Sign-In

Project Number:	**Project Name:**
[1]Date:	**Time:**
Briefing Conducted by:	**Signature:**

This sign-in log documents the tailgate briefing conducted in accordance with the site specific HASP. Personnel who perform work operations on site are required to attend each briefing and to acknowledge receipt of each briefing, daily.

TOPICS COVERED (check all those covered):

☐ Accident Reporting Procedures	☐ General PPE Usage	☐ Site Control	☐ Other:
☐ Cellular Phone Charged w/Service	☐ Heat Stress	☐ Site Emergency Procedures	☐ Other:
☐ Changes to the HASP	☐ Hearing Conservation	☐ Slips, Trips, Falls	☐ Other:
☐ Cold Stress	☐ Lockout/Tagout	☐ Traffic Safety	☐ Other:
☐ Confined Space	☐ Personal Hygiene	☐ Other:	☐ Other:
☐ Decon Procedures	☐ Respiratory Protection	☐ Other:	☐ Other:
☐ Exposure Guidelines	☐ Review of Hazards	☐ Other:	☐ Other:

Daily Safety Topic Description:

Personnel Sign-in List

Printed Name	Signature	Company Name	Time-In	Time-Out

[1] This form is applicable for *only* 1 day of site activity.

GEI Consultants

Utility Clearance Documentation

Project: _____

Site: _____

Drilling Location ID: _____

Driller: _____

GEI PM: _____

GEI Field Team Leader: _____

Utility Drawings Reviewed: _____

Provided By: _____

Reviewed By: _____

One Call Utility Clearance Call Date: _____

Utility Clearance Received back from (list utilities): _____

Completed By (Company): _____ Date: _____

GEI Staff Responsible for Oversight: _____

Metal Detector Survey (yes/no): _____

Drilling Location Cleared by: _____

Contractor: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Physical Test Pit Clearance Required (yes/no): _____

Contractor: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Handclearing Performed: _____ Date: _____

Contractor: _____

GEI Staff Responsible for Oversight: _____

Notes: _____

_____

Based upon the best available information, appropriate utility clearance proceedures were performed for the invasive work specified. If client ordered/site specific deviations from existing GEI utility clearance procedures exist, they are approved by the client signature below.

Client Signature (Optional): _____ Date: _____

GEI, Inc. Representative: _____ Date: _____

Appendix E

GEI's Health and Safety SOPs and Programs

Applicable GEI H&S SOPs *(check all that apply)*		
☒ Biological Hazards – 001	☒ Inclement Weather – 010	☐ Aerial Lift – 020
✔ Bloodborne Pathogens – 002	☐ Ladders -011	☒ Mobile Equipment – 021
☒ Container Management – 003	☒ Noise Exposure -012	☐ Aquatic Ecological Survey & Electrofishing -022
☒ Driver Safety - 004	☐ Nuclear Density Gauge Operation -013	☐ Scaffolding - 023
☒ Electrical Safety - 005a	☒ Utility Markout-014	☐ Wilderness Safety - 024
☒ Lockout Tagout - 005b	☐ Respirator Fit Test Procedure-015	☒ Manual Lifting – 025
☒ Excavation Trenching - 006	☒ Traffic Hazards -016	✔ Hazard Identification - 026
☒ Non-Powered Hand Tools - 008a	☐ Water Safety – 017	☐ Confined Space Entry for Sanitary Sewers – 027
☐ Powered Hand Tools – 008b	☒ Working Around Heavy Equipment – 018	☐ Safe Trailer Use – 028
☒ Hazardous Substances Management -009	☐ Rail Safety -019	✔ COVID-19 Consolidated Workplace Guidelines

Scan this QR code with your smartphone to access all GEI H&S SOPs

Applicable GEI H&S Programs *(check all that apply)*		
☐ Asbestos Program	☐ DOT Driver Safety	☐ Hydrogen Sulfide
☐ Arsenic Safety	✔ Ergonomic	☐ Injury and Illness Prevention (California Only)
☒ Benzene Awareness	☐ Fall Protection	☐ Respiratory Protection Program
☐ Cadmium Safety	✔ Hazard Communication	☐ Lead Awareness
☒ Cold Stress	☒ Hearing Conservation	✔ Fire Prevention
☐ Confined Space Entry	☒ Heat Illness Prevention	
☐ Crystalline Silica	☐ Hexavalent Chromium	

Scan this QR code with your smartphone to access all GEI Programs

STANDARD OPERATING PROCEDURES

SOP No. HS-001 Biological Hazards

1.1 Objective

The objective of this Standard Operating Procedure (SOP) is to prevent or limit the potential for GEI personnel to encounter biological hazards during field activities.

1.2 General

This SOP is intended for use by employees engaged in work with the potential for contact with biological hazards such as animals, insects, plants, and sewage. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the potential for encounters with biological hazards and the control methods to be implemented by GEI employees. These hazards must be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.3 Mammals

During some site operations, animals such as stray or domesticated dogs or cats, raccoons, snakes, bears, rats, bats, etc. may be encountered. Employees should use discretion and attempt to avoid contact with animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting a licensed animal control technician.

1.3.1 Rabies

The rabies virus is transmitted through the bite of an infected animal or contact with saliva or brain/nervous system tissue of an infected animal. The rabies virus infects the central nervous system, causing disease in the brain. The early symptoms of rabies in people are fever, headache, and general weakness or discomfort. As the disease progresses, more specific symptoms appear and may include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucinations, agitation, hypersalivation (increase in saliva), difficulty swallowing, and hydrophobia (fear of water). Death usually occurs within days of the onset of these symptoms.

If you are bitten or think you may be exposed, wash any wounds immediately and thoroughly with soap and water. Then go to the hospital emergency room and notify the Project Manager and the People Safety Team. The doctor, possibly in consultation with the state or local health department, will decide if you need a rabies vaccination. Decisions to start series of vaccinations will be based on your type of exposure and the animal you were exposed to, as well as laboratory and surveillance information for the geographic area where the exposure occurred. If possible have someone document what type of animal it was, how it was behaving prior to the bite, what caused it to bite the

employee, and if it's not a domestic animal that would be easy to find again in the future, try to get animal control on site to capture it. An Incident Report Form must be completed and submitted, per GEI's Incident reporting procedures. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

1.4 Insects and Arachnids

Insects, including bees, wasps, hornets, mosquitoes, ticks, spiders, etc., may be present at a job site making the chance of a bite/sting possible. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life-threatening condition. Some insect bites can transmit diseases such as Lyme disease or a virus such as West Nile. The following is a list of preventive measures:

- Apply insect repellent prior to performing field work and as often as needed throughout the work shift.
- Wear proper personal protective equipment (PPE), including protective clothing (work boots, socks, and light colored clothing).
- Wear shoes, long pants with bottoms tucked into boots or socks, and a long-sleeved shirt when outdoors for long periods of time, or when many insects are most active (between dawn and dusk).
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible.
- Field personnel who have or may have insect allergies must have insect allergy medication onsite and must inform the Site Safety Officer (SSO) and the People and Safety Team of their particular allergy prior to commencing work.
- Field personnel should perform a self-check at the end of the day for ticks.

1.4.1 Tick-borne Diseases

Lyme Disease

Lyme disease is caused by infection from a deer tick that carries a spirochete (a bacterium). During the painless tick bite, the spirochete may be transmitted into the bloodstream, often after feeding on the host for 12 to 24 hours. The ticks that cause the disease are often no bigger than a poppy seed or a comma in newsprint. The peak months for human infection are from May to September.

Symptoms appear in three stages. First symptoms usually appear from 2 days to a few weeks after a person is bitten by an infected tick. Symptoms usually consist of a ring-like red rash on the skin where the tick was attached. The rash is often bulls-eye like with red around the edges and clear in the center. The rash may be warm, itchy, tender, and/or "doughy." This rash appears in only 60 to 80 percent of infected persons. An infected

person also has flu-like symptoms of a stiff neck, chills, fever, sore throat, headache, fatigue, and joint pain. These symptoms often disappear after a few weeks.

The second stage symptoms, which occur weeks to months later include meningitis, severe headache, drooping of the muscles on the face, called Bell's Palsy, encephalitis, numbness, withdrawal, and lethargy. These symptoms may last for several weeks to several months. Third stage symptoms, which occur months or years later include arthritis, heart problems, and loss of memory. The third stage symptoms may mimic multiple sclerosis and Alzheimer's disease.

When in areas that could harbor deer ticks, employees should wear light color clothing, and visually check themselves and check and be checked by another employee when coming from wooded or vegetated areas. If a GEI employee has a tick bite, the People and Safety Team and Project Manager must be contacted immediately. The employee will be offered the option for medical treatment by a physician, which typically involves antibiotics. An Incident Report form must be completed in compliance with the Incident Reporting procedures. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

If personnel feel sick or have signs similar to those mentioned above, the SSO and the People and Safety Team must be notified immediately.

Figure 1: From left to right, the deer tick adult female, adult male, nymph, and larva on a centimeter scale.

How to Remove a Tick

A tick can be removed from the skin by pulling gently at the head with tweezers. If tweezers are not available, use tissue paper or cloth to grasp the tick. It is important to grasp the tick as close to the site of attachment and use a firm steady pull to remove it. Wash hands immediately after with soap and water. The affected area should also be washed with soap and water, then disinfected with an antiseptic wipe, if available. All mouth parts must be removed from the skin. If the tick was removed by breaking off the

mouth parts, an irritation or infection may occur because the organism that is causing the disease can still enter the body through the skin.

Treatment for Lyme Disease

Treatment with antibiotics is effective and recovery is usually complete. For first stage symptoms, antibiotics are usually given orally. However, treatment for second and third stage symptoms is prolonged and recovery may take longer. Antibiotic treatment is usually provided intravenously for second and third stage Lyme disease.

Babesiosis

The deer tick can also cause Babesiosis, an infection of the parasite Babesia Microti. Symptoms of Baesiosis may not be evident, but may also include fever, fatigue and hemolytic anemia lasting from several days to several months. Babesiosis is most commonly diagnosed in the elderly or in individuals whose immune systems are compromised. If there are no signs or symptoms of Babesiosis, usually no treatment it needed. If an employee believes they might have Babesiosis they'll see a physician to be tested. Treatment usually consists of taking prescription medications for 7 to 10 days.

Ehrlichiosis

Ehrlichiosis is a tick-borne disease which can be caused by either of two different organisms. Human monocytic ehrlichiosis (HME) is caused by *Ehrlichia chaffeensis*, which is transmitted by the lone star tick (*Amblyomma americanum*). Human granulocytic anaplasmosis (HGA), previously known as human granulocytic ehrlichiosis (HGE), is caused by *Anaplasma phagocytophilia*, which is transmitted by the deer tick (*Ixodes scapularis*).

Ehrlichiosis is transmitted by the bite of infected ticks, including the deer tick and the lone star tick. The symptoms of HME and HGE are the same and usually include fever, muscle aches, weakness and headache. Patients may also experience confusion, nausea, vomiting and joint pain. Unlike Lyme disease or Rocky Mountain spotted fever, a rash is not common. Infection usually produces mild to moderately severe illness, with high fever and headache, but may occasionally be life-threatening or even fatal. Symptoms appear 1 to 3 weeks after the bite of an infected tick. However, not every exposure results in infection. For those that become infected a drug called Doxcycline will be prescribed.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is a tick-borne disease caused by a rickettsia (a microbe that differs somewhat from bacteria and virus). In the eastern United States, children are infected most frequently, while in the western United States, disease incidence is highest among adult males. Disease incidence is directly related to exposure to tick-infested habitats or to infested pets. Rocky Mountain spotted fever is characterized by a sudden onset of moderate to high fever (which can last for 2-3 weeks), severe headache, fatigue, deep muscle pain, chills and rash. The rash begins on the legs or arms, may include the

soles of the feet or palms of the hands and may spread rapidly to the trunk or rest of the body. Symptoms usually appear within 2 weeks of the bite of an infected tick. Like Ehrlichiosis the prescription drug Doxcycline is the first line treatment option.

1.4.2 Mosquito-Borne Disease

West Nile Virus
West Nile Virus is a mosquito-borne infection transmitted through the bite of an infected mosquito. The symptoms of West Nile Virus can be asymptomatic (no symptoms) or in more serious cases can lead to West Nile Fever. West Nile Fever can include fever, headache, tiredness, body ache, an occasional rash on the trunk of the body, and swollen lymph glands, In severe cases, people have developed West Nile Encephalitis or Meningitis which symptoms include fever, headache, neck stiffness, tremors, coma, and in some cases death. The incubation period for the disease is usually 2 to 15 days. The symptoms can range from a few days to several weeks. Most mosquitoes are not infected and the chance of infection from a mosquito bite of an on-site employee is very small.

1.5 Repellants

The following precautions will be used to help reduce the risk of mosquito bites:

Reduce mosquito-breeding areas by making sure wheelbarrows, buckets, and other containers are turned upside down when not used so that they do not collect standing water. According to the Environmental Protection Agency (EPA), many mosquitoes can breed in pooled water that's minimal enough to fill a bottle cap.

Wear shoes, long pants with bottoms tucked into boots or socks, and a long-sleeved shirt when outdoors for long periods of time, or when many mosquitoes are most active (between dawn and dusk).

Use mosquito repellant according to the manufacturer's directions when outdoors for long periods of time and when mosquitoes are most active.

Centers for Disease Control and Prevention (CDC) evaluation of information contained in peer-reviewed scientific literature and data available from the EPA has identified several EPA-registered products that provide repellent activity sufficient to help people avoid the bites of disease carrying mosquitoes. Products containing these active ingredients typically provide reasonably long-lasting protection:

- **DEET** (Chemical Name: N,N-diethyl-m-toluamide or N,N-diethly-3-methyl-benzamide)
- **Picaridin** (KBR 3023, Chemical Name: 2-(2-hydroxyethyl)-1-piperidinecarboxylic acid 1-methylpropyl ester)

- **Oil of Lemon Eucalyptus** or **PMD** (Chemical Name: para-Menthane-3,8-diol) the synthesized version of oil of lemon eucalyptus
- **IR3535** (Chemical Name: 3-[N-Butyl-N-acetyl]-aminopropionic acid, ethyl ester)
- **Permethrin** (3-Phenoxybenzyl (1RS)-cis,trans-3-(2,2-dichlorovinyl) -2,2-dimethylcyclopropanecarboxylate) **–** Permethrin kills ticks and can be used on clothing (but not skin)

The EPA characterizes the active ingredients DEET and Picaridin as "conventional repellents" and Oil of Lemon Eucalyptus, PMD, and IR3535 as "biopesticide repellents", which are derived from natural materials.

In general, higher concentrations of active ingredient provide longer duration of protection, regardless of the active ingredient, although concentrations above approximately 50 percent do not offer a marked increase in protection time. Products with less than 10 percent active ingredient may offer only limited protection, often from 1 to 2 hours. Products that offer sustained release or controlled release (micro-encapsulated) formulations, even with lower active ingredient concentrations, may provide longer protection times. Regardless of what product you use, if you start to get mosquito bites reapply the repellent according to the label instructions or remove yourself from the area with biting insects if possible.

Clothing and other products can be purchased pre-treated, or products can be treated using EPA-registered products. Permethrin is the only pesticide approved by the EPA for these uses. Permethrin binds tightly to the fabrics, resulting in little loss during washing and minimal transfer to the skin. Permethrin is poorly absorbed through the skin, although sunscreens and other products may increase the rate of skin absorption.

If you decide to use permethrin-treated clothing, consider these tips:

- Read the application instructions carefully and apply the product according to the label directions. Do not over-treat products.
- Permethrin treatments are only intended for use on fabrics; do not apply them directly to the skin or other items.
- Do not apply permethrin to clothing while it is being worn.
- Apply the product to clothing outdoors in well ventilated areas that are protected from wind.
- Hang treated fabrics outdoors and allow them to dry completely before wearing them.
- Wash permethrin treated clothing separately from other clothing items.

1.6 Poisonous Plants

The potential for contact with poisonous plants, such as poison ivy, oak, and sumac exists when performing fieldwork in wooded or boggy areas. Urushiol, an oily organic allergen found in plants, can cause an allergic reaction when in contact with the leaves or vines.

Poison ivy can be found as vines on tree trunks or as upright bushes. Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring. Poison ivy grows throughout much of North America, including all states east of the Rocky Mountains. It is normally found in wooded areas, especially along edge areas where the tree line breaks and allows sunshine to filter through. It also grows in exposed rocky areas, open fields, and disturbed areas.

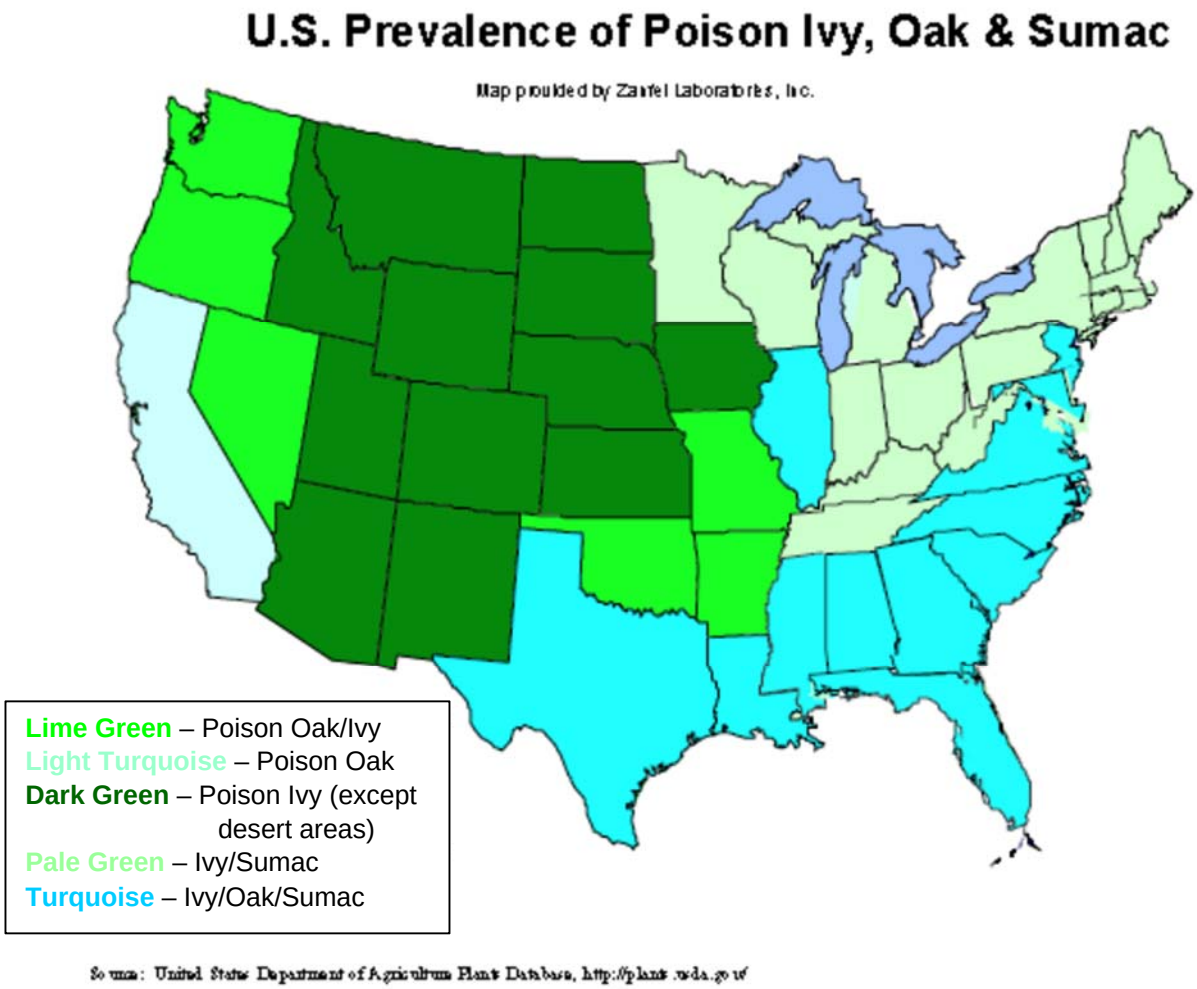
Poison oak can be present as a sparsely-branched shrub. Poison oak can grow anywhere in the United States with the exception of Hawaii, Alaska, and some southwest areas that have desert climates. Poison oak is similar to poison ivy in that it has the same leaflet configuration; however, the leaves have slightly deeper notches.

Poison sumac can be present in the form of a flat-topped shrub or tree. It has fern-like leaves, which are velvety dark green on top and pale underneath. The branches of immature trees have a velvety “down.” Poison sumac has white, “hairy” berry clusters. Poison sumac grows exclusively in very wet or flooded soils, usually in swamps and peat bogs, in the eastern United States.

Poison Ivy

Poison Oak

Poison Sumac



To prevent exposure to these poisonous plants:

- Wear proper PPE, including long sleeves, long pants, boots, and gloves.
- Barrier skin creams, such as lotion containing bentoquatum (Tecnu®), may offer some protection prevent the occurrence of exposure symptoms.
- Contact with poison ivy, sumac, or oak may lead to a skin rash, characterized by reddened, itchy, blistering skin which needs first aid treatment. Employees with known allergies should identify themselves to the SSO or Project Manager prior to starting field work as a precautionary measure. If you believe you have contacted one of these plants:
    - Immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.
    - Contact the People and Safety Team and Project Manager immediately after caring for affected skin.

  - Wash exposed clothing separately in hot water with detergent.

- After use, clean tools, and soles of boots with rubbing alcohol or soap and lots of water. Urushiol can remain active on the surface of objects for up to 5 years.
- If a rash occurs, contact the People and Safety Team and complete and submit an Incident Report Form. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

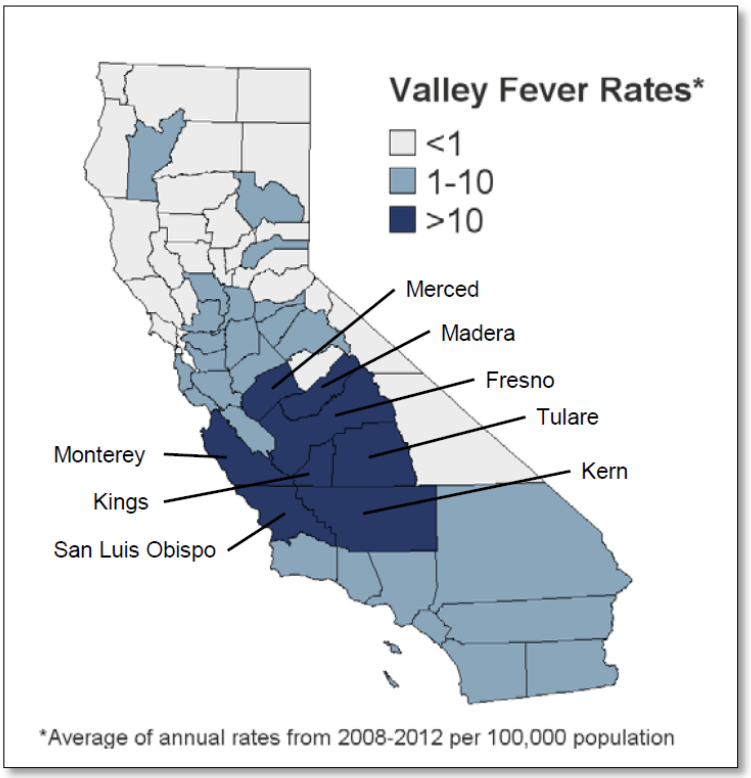
1.7 Sewage and Bacterial Impacted Sediments

Some project work may be conducted at sites that serve or have served as a combined sewer overflow and consequently may have received untreated sanitary sewage from numerous sources. Decomposed sewage can potentially be encountered within sites and their sediments. Sediments could contain soil and marine microorganisms, and bacterium associated with sewage. Many of these bacterium can cause illness through ingestion, direct contact, or the inhalation of a bio-aerosol possibly in the form of dust. Potential respiratory exposure to biological agents can also occur through the inhalation of aerosols produced during sediment handling activities. PPE as identified in the site-specific HASP will be worn to minimize potential exposures. Employees will follow the decontamination or disposal procedures identified in the HASP.

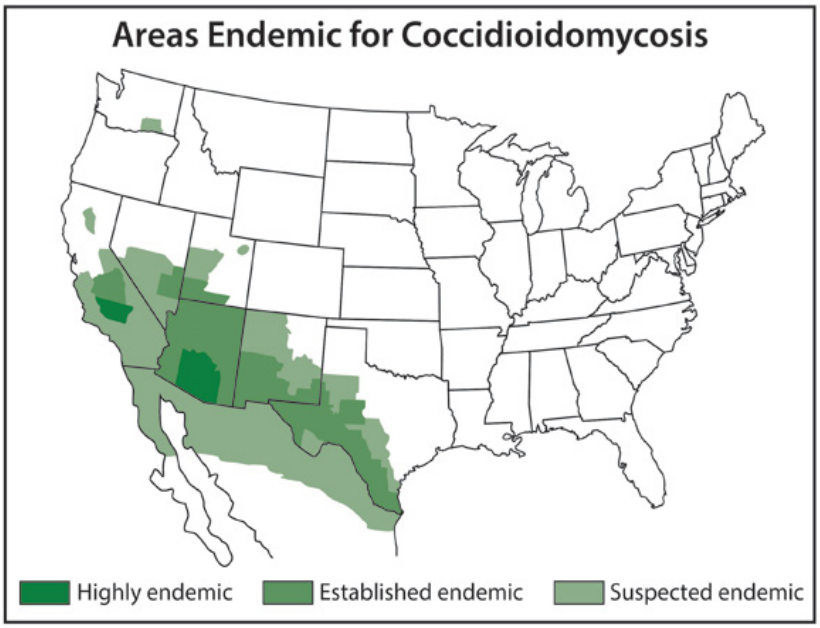
1.7.1 Fungal Spores in Soil – Valley Fever

Valley Fever is an illness that usually affects the lungs. It is caused by the fungus *Coccidioides immitis* that lives in the top 2 to 12 inches of soil in many parts of California. When fungal spores are present, any work activity that disturbs the soil, such as digging, grading, or other earth moving operations, or vehicle operation on dirt roads, can cause the spores to become airborne, therefore increasing the risk of Valley Fever. All employees on sites where the fungus is present, and who are exposed to dusty conditions and wind-blown dusts are at increased risk of becoming infected.

Valley Fever fungal spores are too small to be seen, and there is no reliable way to test the soil for spores before working in a particular place. Valley Fever can be found throughout the southwestern United States, parts of Mexico, and South America. Some California counties consistently have Valley Fever fungus present in the soil. In these regions Valley Fever is considered endemic. Health departments track the number of cases of Valley Fever illness that occur. This information is used to map illness rates as seen on the figures below from the Center of Disease Control Valley Fever Awareness website.



Rates of reported Valley Fever cases in California counties from 2008–2012. Darkest colored counties had the highest rates of Valley Fever.



When present, symptoms usually occur between 7 to 21 days after breathing in spores, and can include:

- Cough
- Fever
- Chest pain
- Headache
- Muscle aches
- Rash on upper trunk or extremities
- Joint pain in the knees or ankles
- Fatigue

Symptoms of Valley Fever can be mistaken for other diseases such as the flu (influenza) and TB (tuberculosis), so it is important for employees to obtain medical care for an accurate diagnosis and possible treatment.

While there is no vaccine to prevent Valley Fever, the following important steps must be taken in order to limit risk:

- Determine if the worksite is in an endemic area. Contact the local health department for more information about the risk in the county GEI is performing work that may disturb soils.
- Prepare work plans and work practices that reduce employee's exposure, which may include:
    - Provide air conditioned cabs with properly maintained dust filters for vehicles that generate heavy dust and make sure employees keep windows and vents closed.
    - Suspend work during heavy winds.
- When exposure to dust is unavoidable, National Institute for Occupational Safety and Health (NIOSH)-approved respiratory protection with particulate filters rated as N95, N99, N100, P100, or High Efficiency Particulate Air (HEPA) must be provided. The Project Manager must work with the Safety Team to develop and implement a respiratory protection program in accordance with California's Occupational Safety and Health Administration (Cal/OSHA's) Respiratory Protection standard (8 CCR 5144) for the project.
- Take measures to reduce transporting spores offsite, such as:
    - Clean tools, equipment, PPE, and vehicles before transporting offsite.
    - If employee's clothing is likely to be heavily contaminated with dust, provide coveralls and change rooms, and showers where possible.

1.8 Injury Reporting

If a GEI employee suffers an injury, bite, or sting on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.9 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.10 References

http://www.cdc.gov/ncidod/dvbid/westnile/index.htm
http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm
http://www.epa.gov/pesticides/health/mosquitoes/insectrp.htm
http://www.cdc.gov/niosh/topics/lyme/
Protecting Yourself from Ticks and Mosquitoes, NIOSH Fast Facts, Publication No. 2010-119
http://npic.orst.edu/pest/mosquito/ptc.html
http://www.cdc.gov/features/valley-fever-10-things/
https://www.cdph.ca.gov/HealthInfo/discond/Documents/VFGeneral.pdf
https://blog.epa.gov/blog/tag/mosquitoes/

1.11 Attachments

None

1.12 Contact

Health&SafetyTeam@geiconsultants.com

1.13 Review History

- June 2016
- June 2014
- November 2013
- October 2010

STANDARD OPERATING PROCEDURES

SOP No. HS-002 Infectious Materials and Bloodborne Pathogens Exposure Control Plan

1.1 Objective

GEI personnel may come in contact with potentially infectious agents (materials) when performing first aid or cardiopulmonary resuscitation (CPR). Employees may also come into contact with these agents when working at certain contaminated sites (i.e., urban sites, discarded contaminated needles, or sewer outfall exposures). This standard operating procedure (SOP) has been developed to minimize the potential for exposure to employees who may contact, directly or indirectly, infectious agents.

1.2 General

This SOP is intended for use by employees engaged in work with the potential for contact with infectious materials and bloodborne pathogens. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the potential for encounters with infectious materials or bloodborne pathogens and the control methods to be implemented by GEI employees. Exposure determinations are made by listing job functions impacted by potential exposure. The HASP will list job classifications or tasks in which occupational exposure could occur such as employees collecting samples or expected to provide First Aid. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Exposure determinations are made without regard to the use of personal protective equipment. When differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials. *Universal Precautions (i.e., treat all potentially infectious materials as if it were infected) will be used by GEI employees.*

1.3 Exposure Control Plan

1.3.1 Standard Procedures

A written Exposure Control Plan applicable to potential occupational exposure to blood or other potentially infectious materials will be developed as necessary based on project hazards. This plan will be accessible to each affected employee.

Sampling of materials containing potentially infectious materials will be performed in a manner that minimizes the potential for creating splashes, droplets, or aerosols. Mechanical pipetting devices will be used for manipulating sanitary sewer effluent. Mouth pipetting is prohibited.

The use of glassware or equipment with sharp or pointed edges will be kept at a minimum to reduce the potential of injury that would create a direct route of entry into the body for infectious materials.

Minor cuts, scratches, or other breaks in the skin barrier will be covered prior to the handling of infectious materials. Employees experiencing exudative lesions or weeping dermatitis will refrain from direct contact with infectious materials.

Eating, drinking, smoking, or application of cosmetics is not permitted in areas where potentially infectious materials are handled or sampled.

Employees will wash and disinfect their hands, face, or other potentially contaminated skin surfaces upon completing the handling of infectious or potentially infectious agents or after rendering first aid. Hand washing facilities are readily available at all work locations. When provision of hand washing facilities is not feasible, either an appropriate antiseptic hand cleanser used in conjunction with clean cloth/paper towels or antiseptic towelettes will be provided.

All equipment and environmental and working surfaces will be cleaned and decontaminated after contact with blood or other potentially infectious materials. Specimens of blood or other potentially infectious materials (i.e. bandages) will be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.

1.3.2 Personal Protective Equipment

When there is a potential for occupational exposure GEI will provide, at no cost to the employee, appropriate personal protective equipment (PPE). PPE will be worn to reduce the potential of exposures to splashes or aerosols. At a minimum, PPE will include safety glasses and appropriate gloves, but may also require the use of face, respiratory, foot, and full-body protection. Refer to the site-specific HASP for specific PPE requirements.

Disposable PPE used in the handling or sampling of infectious materials will be appropriately disposed of and not reused.

1.3.3 Medical Monitoring

Medical monitoring is required for an employee when a potential workplace exposure has occurred. GEI will make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident. These are made available at no cost to the employee. The employee must follow the GEI Incident Reporting procedures regarding the potential exposure as soon as possible. For infectious agents in which a medically accepted vaccination has been developed (e.g., hepatitis B virus) (HBV) potentially exposed employees will be given the option to receive an inoculation at no cost. Employees who have been exposed will be given the option to receive a confidential medical evaluation also at no cost. Required records for exposed

employees will be kept confidential. GEI will keep these medical records for at least the duration of employment plus 30 years and will be maintained for 3 years from the date on which the training occurred. All records required to be maintained shall be made available and GEI will comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h).

1.3.4 Training

Training will be conducted at the time of initial assignment to tasks where exposure may take place and at least annually thereafter. All training for employees shall be provided within one year of their previous training. Employees with a reasonable risk for exposure must complete Bloodborne Pathogen training covering the following topics:

- An explanation of the Occupational Health and Safety Administration (OSHA) bloodborne pathogen standard.
- A general explanation of bloodborne diseases.
- An explanation of the modes of transmission of bloodborne diseases.
- Communications of hazards to employees.
- An explanation of the GEI's Bloodborne Pathogen SOP and exposure control plan.
- Appropriate methods for recognizing tasks that involve potential exposure.
- An explanation of the use and limitations of methods to prevent exposure.
- Proper types, use, handling, decontamination, and disposal of PPE.
- The availability of HBV vaccines and the procedures for obtaining a vaccination.
- Appropriate actions to take during an emergency involving bloodborne pathogens.
- Post-exposure procedures.
- An explanation of required signs and labels.

1.4 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health and Safety Officer (RHSO).

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People and Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the RHSO will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other

appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.5 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.6 Attachment

None

1.7 Reference

OSHA 29 CFR 1910.1030 – Bloodborne Pathogens

1.8 Contact

SafetyTeam@geiconsultants.com

1.9 Review History

- October 2018
- June 2016
- June 2014
- November 2013
- January 2011
- November 2010

STANDARD OPERATING PROCEDURES

SOP NO. HS-003 Container Management

1.1 Objective

This Standard Operating Procedure (SOP) has been developed to minimize the potential for injuries to GEI employees performing container and drum handling and sampling, through proper use of engineering and administrative controls, personal protective equipment (PPE), and education.

1.2 General

This SOP is intended for use by employees engaged in work with the management of containers that may contain hazardous substances or contaminated media. The site-specific health and safety plan (HASP) should include a hazard assessment and control methods to be implemented by GEI employees. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

Hazardous substances and contaminated media will be handled, transported, labeled, and disposed of in accordance with this paragraph. Drums and containers will meet the appropriate United States Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), and Environmental Protection Agency (EPA) regulations for the wastes that they contain.

Site operations will be organized to minimize the amount of drum or container movement. Prior to movement of drums or containers, employees exposed to the transfer operation will be notified of the potential hazards associated with the contents of the drums or containers. Unlabeled drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, shall be on hand and ready for use to control incipient fires.

DOT specified salvage drums or containers and suitable quantities of proper absorbent will be kept available and used in areas where spills, leaks, or ruptures may occur. Where spills may occur, a spill containment program, which may be part of the HASP, will be implemented to contain and isolate the entire volume of the hazardous substance being transferred.

1.3 Opening Drums and Containers

The following procedures will be followed in areas where drums or containers are being opened:

- Employees not actually involved in opening drums or containers will be kept a safe distance from the drums or containers being opened.
- If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation will be placed between the employee and the drums or containers being opened to protect the employee in case of accidental release.
- GEI employees will not handle or attempt to open bulging containers. Employees will not stand upon or work from drums or containers. GEI will contract with a hazardous waste company to handle, manage, and dispose of a bulging drum.

1.4 Material Handling Equipment

Several types of equipment can be used to move drums: (1) a drum grappler attached to a hydraulic excavator; (2) a small front-end loader, which can be either loaded manually or equipped with a bucket sling; (3) a rough terrain forklift; (4) a roller conveyor equipped with solid rollers; and (5) drum carts designed specifically for drum handling. GEI employees will not operate heavy equipment to move drums. This will be handled by an authorized subcontractor.

The following procedures can be used to maximize worker safety during drum handling and movement:

- Train personnel in proper lifting and moving techniques to prevent back injuries.
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface.
- Air condition the cabs of vehicles to increase operator efficiency; protect the operator with heavy splash shields.
- Supply operators with appropriate respiratory PPE when needed. Normally either a combination SCBA/SAR with the air tank fastened to the vehicle, or an airline respirator, and an escape SCBA are used because of the high potential hazards of drum handling. This improves operator efficiency and provides protection in case the operator must abandon the equipment.
- Have overpacks ready before any attempt is made to move drums.
- Before moving anything, determine the most appropriate sequence in which the various drums and other containers should be moved. For example, small

containers may have to be removed first to permit heavy equipment to enter and move the drums.

- Exercise extreme caution in handling drums that are not intact and tightly sealed.

- Ensure that operators have a clear view of the roadway when carrying drums. Where necessary, have ground workers available to guide the operator's motion.

1.5 Leaking, Open, and Deteriorated Drums

If a drum containing a liquid cannot be moved without rupture, immediately transfer its contents to a sound drum using a pump designed for transferring that liquid. Contract an approved vendor to immediately use an over pack container if the:

- Leaking drum contains sludge or semi-solids;

- Open drum contains liquid or solid waste;

- Deteriorated drum can be moved without rupture.

1.6 Radioactive Wastes

GEI does not routinely handle or manage radioactive waste. If required to do so for a project, procedures will be approved by the Corporate Health and Safety Officer (CHSO) and Regional Health and Safety Officer (RHSO).

1.7 Shock-Sensitive Wastes

GEI employees will not handle shock-sensitive waste. Shock-sensitive waste or chemicals may explode with friction, movement or heat. Some chemicals are shock-sensitive by nature-, others become shock-sensitive through drying, decomposition, or slow reactions with oxygen, nitrogen, or the container. Some chemicals that are, or can, become shock-sensitive will have that hazard noted in the safety data sheet (SDS).

- Drums and containers containing packaged laboratory wastes will be considered to contain shock-sensitive or explosive materials until they have been characterized. *Caution: Shipping of shock-sensitive wastes may be prohibited under U.S. Department of Transportation regulations. Shippers will refer to 49 CFR 173.21 and 173.50.*

1.8 Laboratory Waste Packs

It is unlikely that GEI employees work in an environment where laboratory waste packs are used. However if one is found, do not handle or open it. Complete the incident reporting form to identify finding the pack and then work with the Project Manager to find the appropriate means of disposal.

1.9 Sampling of Drum and Container Contents

Sampling of containers and drums will be done in accordance with a site-specific sampling plan that will be developed in conjunction with a site-specific HASP.

1.10 Staging Areas

Drums and containers will be identified and classified prior to packaging for shipment. Drum or container staging areas will be kept to a minimum number as approved by the client to safely identify and classify materials and prepare them for transport. Staging areas will be provided with adequate access and egress routes. Bulking of hazardous wastes will be permitted only after a thorough characterization of the materials has been completed and approved by the Client. GEI employees will not sign manifests unless a written authorization agreement is in place with the Client.

1.11 Shipment and Training

Shipment of materials to off-site treatment, storage, or disposal facilities involves the entry of waste hauling vehicles into the site. U.S. Department of Transportation (DOT) regulations (49 CFR Parts 171-178) and EPA regulations (40 CFR Part 263) for shipment of wastes must be complied with. Employees managing hazardous waste on behalf of a client must complete annual RCRA training and triannual DOT hazardous materials training. Training must be current and a manifest agreement with the client must be in place before employees can sign hazardous waste manifests on behalf of a client.

1.12 Tank and Vault Procedures

GEI employees do not routinely sample vaults and tanks. Entry procedures will be coordinated and approved by the CHSO and RHSO.

1.13 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health & Safety Officer (RHSO).

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the RHSO will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health & Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the

potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.14 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection and appropriate training must be current

1.15 References

OSHA 1910.120 Hazardous Waste Operations and Emergency Response (j) Handling of Drums and Containers

1.16 Attachment

None.

1.17 Contact

Health&SafetyTeam@geiconsultants.com

1.18 Review History

- June 2016
- May 2014
- November 2013
- October 2011
- Initial Version Date Unknown

STANDARD OPERATING PROCEDURE

HS-004 Driver Safety

1.1 Objective

GEI has implemented a Safe Driving Program to encourage safe driving habits and promote the ongoing safety of our staff and the communities where we work. For more information, refer to the Operation of Vehicles section of GEI's Employee Handbook.

This Standard Operating Procedure (SOP) provides requirements and recommendations to minimize the potential risks while operating or riding in a motor vehicle.

1.2 General

GEI employees will adhere to the following requirements when operating a vehicle while conducting business on behalf of GEI. These requirements apply to GEI-owned, rental, and personal vehicles used to conduct GEI business:

- Employees must maintain a valid and current driver's license.
- Employees using a personal vehicle for work-related travel must have proper insurance coverage that meets the requirements in the state in which they reside.
- Employees must wear their safety belt while in a moving vehicle.
- Vehicle incidents will be reported in accordance with GEI's Incident Reporting procedures (*refer to* GEI's Safety App for smart phones or the Safety page on the GEI intranet.).
- Vehicles will be properly maintained and safely operated (*refer to* GEI's Fleet Maintenance Program).
- Employees will follow safe driving behaviors, which include limiting distractions such as manipulating radios or other equipment that may cause a distraction. Employees should not exceed the posted speed limit and should maintain a safe distance between other vehicles.
- When parking a vehicle at a job site, the employee should position the vehicle in a manner which reduces or eliminates the need to operate the vehicle in reverse. It is recommended, a safety cone should be placed at the rear of the vehicle after parking the vehicle and be removed prior to moving the vehicle. This precautionary measure makes the employee aware of other vehicles, equipment, and structures within the backup radius of the vehicle.

When driving an unfamiliar vehicle (rental or GEI-owned), it is the driver's responsibility to orient themselves to the vehicle by:

- Walking around the vehicle to observe the condition of the vehicle and hazards that could be within the travel path.
- Becoming familiar with the size of the vehicle.
- Note if the vehicle has anti-lock braking system (ABS[1]).
- Adjusting mirrors (rear and side).
- Adjust seats to be situated as far back as safely practical, away from the air bag, located in the steering wheel.
- Becoming familiar with dashboard, center console, and steering controls.
- Locating the turn signals, windshield wipers, lights, emergency flashers, and the heating, air conditioning, and defrost controls.

1.3 Driving Defensively

Driving defensively means not only taking responsibility for oneself and actions but also keeping an eye on "the other guy." Good defensive drivers may be able to anticipate what the other driver will do next. GEI recommends the following guidelines to help reduce risks while driving:

- Do not start the vehicle until each passenger and any belongings are secured in the vehicle.
- Remember that driving above or below the speed limit can increase the likelihood of a collision.
- Be aware of impaired drivers; if a car is straddling the center line, weaving, making wide turns, stopping abruptly, or responding slowly to traffic signals, the driver may be impaired or using a cellular telephone. Avoid an impaired driver by turning right at the nearest corner or exiting at the nearest exit.
    - If it appears that an oncoming car is crossing into your lane, pull over to the roadside, sound the horn, and flash the headlights.
    - If an unsafe or suspicious driver is observed, notify the police.
- Follow the rules of the road. Do not contest the "right of way" or try to race another car during a merge. Always be respectful of other motorists.

[1] ABS is a mechanism that allows the wheels on a vehicle to maintain contact with the surface of the road, based on inputs from the driver (braking), to prevent the wheels from locking up (ceasing rotation) and to avoid an uncontrolled skid.

- Allow large vehicles, including tractor trailers, extra breaking distance, turning radius, and avoid traveling in the other driver's blind spots.
- Do not follow too closely. GEI employees should use a minimum of "3-second following distance."
- While driving, be cautious, aware, and responsible.
- Use extra caution, observe road signs, and reduce speed in construction areas and school zones.
- Always be aware of pedestrians, bicyclists, and motorcyclists.

1.4 Cellular Phone Use and Other Distractions

Refer to the *Portable Communication Device Use While Driving* section of the GEI Employee Handbook for GEI's policy on the use of cellular telephones while operating a vehicle.

1.5 Drugs and Alcohol

The use of illegal drugs or alcohol is prohibited when driving a vehicle on GEI business. Be aware of the side effects of prescription and over-the-counter medications which can impair an employee's ability to drive.

1.6 Adverse Driving Conditions

When operating a vehicle, its possible adverse driving conditions may be encountered. Below is a list of possible conditions and how they can be mitigated.

1.6.1 Driving at Night

Vision maybe limited at night due to impairment of the driver's depth perception, color recognition, and peripheral vision. Another factor adding danger to night or early morning driving is fatigue. Drowsiness makes driving more difficult by dulling concentration and slowing reaction time. Effective measures to minimize these hazards by preparing the car and following guidelines:

- Check the headlights to ensure they are properly aimed. If you notice the headlights are not properly aimed, report it to the Branch Manager, or if applicable the rental car agent. Misaimed headlights blind other drivers and reduce the driver's ability to see the road.
- In addition to the known hazards of consuming alcohol prior to driving, night driving can potentially be affected because the recovery rate of glare from headlights is prolonged. Thus reducing your ability to see.

- Smoking in GEI vehicles and rentals is not permitted. When driving a personal vehicle for business, avoid smoking while driving. Nicotine and carbon monoxide may hamper night vision.
- Observe driving safety as soon as the sun goes down. Twilight is one of the most difficult times to drive, because the eyes' pupils are constantly changing to adapt to the growing darkness Always use headlights at dusk and at dawn; lights will not help the driver see better in early twilight, but they will make it easier for other drivers to see your car. Drive at a speed that allows you to see the road that is within the headlights span. Driving in a manner that prevents you from seeing hazards as they are illuminated is known as overdriving the headlights; it may be necessary for the driver to reduce speed to be prepared to brake within the illuminated area of the headlights.
- If an oncoming vehicle does not lower beams from high to low, avoid glare by watching the right edge of the road and using it as a steering guide.
- The driver should make frequent stops for light snacks and exercise. If the driver is too tired to drive, stop in a safe area and get some rest.

1.6.2 Snow/Freezing Conditions

When snow and ice are present, be prepared by following these winter driving safety tips.

1.6.2.1 Prepare the Vehicle Before a Snowstorm

- Check under the hood and take a look at the vehicles cooling system. Make sure the vehicle contains adequate antifreeze and the hoses are in good condition.
- Test heaters and defrosters ahead of time to make sure they are in good working condition.
- Test the windshield wipers and check the condition of the wiper blades. If wipers leave streaks on the windshields, replace the blades at the next possible opportunity. Keep the receipt to expense the cost with GEI or with the car rental company.
- It is recommended that a windshield washer/antifreeze solution is used during winter conditions.
- Check the lights on the vehicle and periodically clear them of snow and dirt.
- Vehicle batteries need extra power in cold conditions. Make sure the battery's terminals are clean and cables are secure.
- Determine if the vehicle has a anti-lock brake (ABS) system.
- Keep the gas tank at least half-full in the winter to help avoid gas line freeze up.

1.6.2.2 Driving During and After a Snowstorm

- Wear sunglasses to aid in limiting reflection from snow.
- Be aware of blind spots created by snow banks.
- Be extra cautious of pedestrians and other vehicles in intersections.
- Allow extra time for braking and increase the distance between your car and the car immediately in front of the car.
- Reduce speed and do not exceed the posted limit.
- If the tires starts to lose traction, remove the foot off the gas and gradually reduce speed. Accelerate slowly once traction is regained.
- If the vehicle starts to skid, and does not have anti-lock brakes, steer into the skid. This will bring the back end of the car in line with the front. Avoid using the brakes. If the vehicle does have anti-lock brakes, firmly brake as you steer into the skid.

1.6.3 Driving In the Rain

To prevent losing control of the car on wet pavement, take these preventive measures.

- Prevent skids by driving slowly and carefully, especially on curves.
- Steer and brake with a light touch.
- When necessary to stop or slow, do not brake hard or lock the wheels.
- Maintain mild pressure on the brake pedal.

Skidding
If the car begins to skid, ease the foot off the gas, and carefully steer the car in the direction you want the front of the car to go. For cars without anti-lock brakes, avoid using the brakes. This procedure, known as "steering into the skid," will bring the back end of the car in line with the front. If the car has anti-lock brake systems (ABS), brake firmly as you steer into the skid.

Hydroplaning
Hydroplaning happens when the water in front of the tires builds up faster than the car's weight can push it out of the way. The water pressure causes the car to lose contact with the road surface and slide on a thin layer of water between the tires and the road. At this point, the car can be completely out of contact with the road, making it possible for the driver to skid or drift out of the lane, or even off the road.

To avoid hydroplaning, keep the tires properly inflated and maintain good tread on the tires. If tires need to be replaced on a company vehicle, notify the branch manager or their designee. Slow down when roads are wet, and stay away from puddles. Try to drive in the tire tracks left by the cars in front of the vehicle. If the car begins to hydroplane, do not brake or turn suddenly. This could throw the car into a skid. Ease the foot off the gas until the car slows; accelerate slowly once traction is regained. If braking is needed, do so gently with light pumping actions. If the car has ABS, brake normally; the car's computer will mimic a pumping action, as necessary.

If weather conditions worsen to the point where the driver is not comfortable driving, pull the vehicle over to a safe location until conditions improve. Do not drive during severe weather conditions. Do not attempt to drive on roads with standing water or that have been flooded. Find an alternate route if these conditions exist.

1.6.4 Off Road

If operation of a vehicle is required off public or private roads or in situations where four-wheel-drive vehicles are required, the appropriate vehicle for the situation will be used.

Be sure any gear or equipment is secured inside the vehicle so it doesn't bounce around while the vehicle is off-road.

- Know the underside of the vehicle. Look under the vehicle and learn where the lowest-hanging parts are located so they are not damaged.
- Scout tricky terrain on foot. Don't hesitate to get out of the vehicle to examine, up close, the terrain and soil conditions. And be sure to scout out what's on the other side of a hill ahead of time so there are no surprises.
- Drive cautiously. Drive, "as slow as possible, as fast as necessary." Remember to use the gears to efficiently manage engine power, braking, and torque.
- Create a mental picture. Look ahead and visualize the paths to the vehicle will travel. Follow those paths.
- Drive straight up and down hills. Avoid diagonal lines that put the vehicle in a situation where it might roll.

1.7 Driver Training

GEI employees are required to complete driver safety training every 3 years. This training is managed by the People Team and will be assigned through GEI's e-learning provider.

1.8 Injury Reporting

GEI employees will report incidents involving GEI personnel or subcontractor personnel, such as: lost time injuries, injuries requiring medical attention, near miss incidents, fires, fatalities, accidents involving the public, chemical spills, vehicle accidents, and property damage. The following steps must be followed when an incident occurs:

1. In life-threatening situations, immediately call 9-1-1.
2. Stop work activity to address any injury, illness, property damage, spill or other emergency.
3. **Immediately** report any incidents to your Supervisor/Project Manager and Regional Health & Safety Officer.
4. If your injury or illness is not life-threatening, call Medcor Triage at 1-800-775-5866 to speak with a medical professional.
5. Complete an Incident Report Form **immediately** after addressing the incident. Report forms are available on GEI's Safety App (for smart phones) and on the Safety page on the GEI intranet.

For vehicle accidents involving another vehicle or damage to property, the employee will take pictures of each vehicle or property involved in the incident and obtain a police report. In some municipalities police will not be dispatched to a non-injury accident, but every effort needs to be made to try and obtain the report.

1.8.1 Injury Triage Service

If a GEI employee experiences a work-related injury that is not life-threatening, the employee will initiate a call to Medcor Triage at 1-800-775-5866. The injured employee will detail any medical symptoms or complaints which will be evaluated by a Registered Nurse (RN) specially trained to perform telephonic triage. The RN will recommend first aid self-treatment or refer the injured employee for an off-site medical evaluation by a health professional at a clinic within GEI's workers compensation provider network. GEI employees are still required to follow our Accident Reporting procedures as listed above.

1.9 Limitations

Follow safety procedures as defined in the site-specific HASP.

1.10 References

National Safety Council
Oklahoma Safety Council
GEI Consultants, Inc. Employee Handbook

1.11 Attachments

None

1.12 Contact

SafetyTeam@geiconsultants.com

1.13 Review History

- December 2017
- November 2016
- May 2014
- November 2013
- January 2011

STANDARD OPERATING PROCEDURES

HS-005a Electrical Safety

1.1 Objective

Electrical hazards are typically the most serious physical hazards GEI employees encounter when working on or near an electric substation, conducting intrusive activities such as excavation or drilling, using powered hand tools, or working near overhead utilities. This Standard Operating Procedure (SOP) has been developed to minimize the potential for exposure to energized electrical equipment while performing work activities.

1.2 General

Employees who face a risk of electric shock will be trained and become familiar with electrically-related safety practices in the GEI annual Health and Safety training. This training will include safety-related work practices that pertain to their respective job assignments and minimum approach distances.

An activity hazard analysis conducted for the project scope of work will evaluate the potential for electrical shock and be incorporated in the site-specific health and safety plan (HASP). In addition, site-specific training will be conducted by the Project Manager or their designee to discuss the project electrical hazards and include a review of the HASP requirements.

Annual health and safety training will include review of this electrical safety SOP and GEI's lockout/tagout requirements. Retraining will be required when there is a change in job assignments; a change in the energy control procedures; or a new hazard is introduced. Retraining may also be conducted through the Project Safety Briefing and documented on the Project Safety Briefing form.

Safe work practices will be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts when work is performed near or on equipment or circuits that are or may be energized. Employees may not enter spaces containing exposed energized parts unless proper illumination, protective shields, protective barriers, or insulating materials (if necessary) are provided to enable employees to work safely. If portable ladders are needed near electrical equipment, they will have non-conductive side rails.

1.3 Personal Protection

Measures to mitigate exposure to overhead and subsurface electrical transmission and distribution lines should be adhered to at all times when working adjacent to electrical hazards. These measures include:

- Electrical Hazard (EH)-rated footwear and hardhat are required when working onsite. Additional personal protective equipment (PPE) may be needed as referenced in the site specific HASP.
- Avoid carrying tools/equipment above waist height if overhead electric hazards exist.
- Maintain the minimum approach distance (MAD) from bus bars, transformer/capacitor electrodes, and overhead transmission/distribution lines.
- Stop work immediately and vacate the work area in the event lightning is observed.

Measures of protection that should be adhered to within an active substation perimeter or if work adjacent to the substation perimeter consists of intrusive activities:

- Contact utility clearance agency at least 48 hours prior to any invasive activities for mark out of underground public utilities.
- Obtain the most recent as-built drawings of the transmission/distribution line layout from the client.
- Mark out of underground transmission/distribution lines by the client survey/mark out personnel if applicable.
- Conduct work under the supervision of the client's Health and Safety representative per client requirements.
- Conductive items such as jewelry or clothing containing metals will not be worn unless they are rendered non-conductive by insulating means such as covering or wrapping with materials that specifically rated as non-conductive, or other insulating means.
- Use hand digging tools specifically designed for use on substation property (i.e., insulated digging bar, long-handled spoon shovel, etc.). In addition, rubber gloves and fire-resistant clothing are required if hand digging in a substation.
- Use insulated lineman's gloves when handling equipment that may come into contact with electrical utilities.
- EH-rated footwear is required when working onsite.
- Flame resistant clothing that meets National Fire Protection Association (NFPA) 70E standards is to be worn.

- Avoid carrying tools/equipment above waist height if overhead electric hazards exist.
- Ground vehicles or equipment **within the substation perimeter** using 4-aught gauge grounding cable. Adhere to specific client or site requirement for grounding.
- Maintain a minimum clearances on substations in accordance with 29 CFR 1910.333 and NFPA 70E standards when working near energized equipment.
- Maintain a minimum offset of 3 feet from marked underground transmission/distribution lines.
- Avoid working within or outside of a substations in conditions of high humidity, rain, or thunderstorms.
- Stop work immediately and vacate the work area in the event lightning is observed.

1.3.1 Minimum Approach Distance

According to OSHA, the MAD is "…the closest distance an employee is permitted to approach an energized or grounded object." MADs ensure that employees do not approach or take any conductive object closer to energized equipment than the allowed distances. All GEI employees conducting work onsite must follow the MADs shown below:

Nominal Voltage in Kilovolts	Minimum Approach Distance: Phase to Ground Exposure
0.05 to 1.0	Avoid Contact
1.1 to 15.0	2'1"
15.1 to 36.0	2'4"
36.1 to 46.0	2'7"
46.1 to 72.5	3'
72.6 to 121	3'2"
138 to 145	3'7"
161 to 169	4'
230 to 242	5'3"
345 to 362	8'6"
500 to 550	11'3"
764 to 800	14'11"

Reference: Table R-6 in OSHA regulation CFR 1910.269 (l) (10)

Unqualified employees must maintain a 10-foot distance from all electrical sources. Vehicular and mechanical equipment will also maintain minimum clearance distances of 10 feet.

Site personnel will assume that all electrical equipment at surface, subsurface, and overhead locations are energized until the equipment has been designated as de-energized by a client representative. Client representatives will be responsible for de-energizing and lockout/tagout of all electrical equipment. If the equipment cannot be de-energized, work will stop and the GEI Field Representative and/or the Site Safety Officer (SSO) will consult with the Project Manager and CHSO. GEI will notify the client prior to working adjacent to this equipment, and will verify that the equipment is energized or de-energized in the vicinity of the project area.

All power lines that have been indicated by the client to be de-energized must be locked out by the client or their representative, such that the lines cannot be energized when personnel are working near them. The lines will not be unlocked and re-energized until GEI notifies the client that they have completed work in the area and that all personnel are clear of the area. The client representatives will thoroughly familiarize GEI personnel with site-specific lockout/tagout procedures during the site orientation. Conductors and parts of electrical equipment that have been de-energized, but not been locked or tagged out, shall be treated as live/energized. Only qualified persons may work on electric circuit parts or equipment that has not been de-energized. Such persons will be made familiar with the use of special precautionary techniques, PPE, insulating and shielding materials, and insulated tools.

If power lines cannot be de-energized, the SSO will consult with the client to discuss how to proceed. Work tasks will only commence after determining that a safe working distance (MAD) can be maintained and all personnel working in the area have been informed of the limitation. All work performed within the substation boundaries requires the use of task-specific PPE as described in the HASP.

GEI will verify that the contractor or subcontractor has located and marked all electric, gas, water, steam, sewer, and other utility service lines before any intrusive work is started. In each case, any utility company that is involved should be notified in advance by the contractor, and its approval or services will be obtained, if necessary.

1.3.2 Ground-Fault Circuit Interrupters (GFCI)

GEI employees will use approved ground-fault circuit interrupters for personnel protection when using electrical tools and equipment. Equipment will be plugged into receptacles protected by a GFCI, extension cords with built-in GFCIs, or a GFCI adapter is to be used.

1.3.3 Equipment Inspection

Each extension cord, plug and receptacle, and any equipment connected by the cord and plug, will be visually inspected before each day's use for external defects, such as deformed or missing pins or insulation damage, and for indications of possible internal damage. Each receptacle and plug will be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor will be connected to its proper terminal.

Inspection of equipment will be performed before first use; before equipment is returned to service following any repairs; before equipment is used after any incident which can be reasonably suspected to have caused damage (e.g., when an extension cord is run over), and at intervals not to exceed 3 months. Cords and receptacles which are fixed and not exposed to damage will be tested at intervals not exceeding 6 months. Equipment found damaged or defective will not be used and will be properly tagged as "Out of Service"; notify the Branch Manager so that the equipment can be replaced or repaired. If the equipment cannot be repaired it will be disposed of properly.

1.4 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or supervisor/project manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health & Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.5 Limitations

- Follow safety procedures as defined in the site-specific HASP at all times.
- If lockout/tagout procedures are going to be performed by GEI employees or GEI subcontractors, the specific procedure will be reviewed with the CHSO and the RHSO.

1.6 References

OSHA 29 CFR 1910.147 Appendix A – The control of hazardous energy (lockout/tagout)

1.7 Attachments

None

1.8 Contact

Health&Safetyteam@geiconsultants.com

1.9 Review History

- February 2017
- May 2014
- October 2011
- August 2010 (Titled Lock Out/Tag Out)

STANDARD OPERATING PROCEDURES
HS-005b Lockout/Tagout

1.1 Objective
Lockout/tagout, otherwise referred to as the control of hazardous energy, is the procedure used to eliminate the hazards from equipment that contains hazardous energy prior to working on or around this equipment. Energy sources that are controlled using lockout/tagout procedures include electrical, mechanical, hydraulic, pneumatic, chemical, or thermal. Other energy sources can include stored energy such as equipment held under tension, pressurized lines, and capacitors. Lockout/tagout also applies to electric generation, and pumping plant inspections and appurtenances.

This Standard Operating Procedure (SOP) has been developed to protect employees from exposure to these types of hazardous equipment while performing work activities on and around equipment. GEI employees will follow the client's lockout/tagout procedures, when available. If the client does not have specific lockout/tagout procedures in place, use these guidelines at a minimum.

This lockout/tagout program will be reviewed by the Safety Team annually. Health and Safety reviews are conducted by the Safety Team to document compliance with these requirements.

1.2 General
Employees servicing, maintaining, or working near machines or equipment may be seriously injured or killed if hazardous energy is not properly controlled. Injuries resulting from the failure to control hazardous energy during maintenance activities can be serious or fatal. Injuries may include electrocution, burns, crushing, cutting, lacerating, amputating, or fracturing body parts.

Employees who have the potential to work with or around equipment where lockout/tagout is needed, will be trained and become familiar with GEI's lockout/tagout procedures. This training will include safety-related work practices that pertain to their respective job assignments.

An activity hazard analysis conducted for the project scope of work will evaluate the potential for exposure to hazardous energy and be incorporated in the site-specific Health and Safety Plan (HASP). In addition, site-specific training will be conducted by the Project Manager or their designee to discuss the project lockout/tagout requirements and include a review of the HASP requirements.

Annual health and safety training will include review of GEI's lockout/tagout requirements. Retraining will be required when there is a change in job assignments, a change in the energy control procedures, or a new hazard is introduced. Retraining may also be conducted through the Project Safety Briefing and documented on the Project Safety Briefing form.

1.3 Roles and Responsibilities

There are two categories of employees in a lockout/tagout program, Authorized and Affected. Regardless of category, employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout/tagout procedures.

1.3.1 Authorized Employees

Authorized employees are responsible for following established lockout/tagout procedures. An authorized employee is defined as a person who locks out or tags out machines or equipment in order to perform service, maintenance, or work near a piece of equipment that contains or has the potential to contain hazardous energy.

Authorized employees will receive training on the following topics:

- Recognition of hazardous energy sources, types, and magnitudes of energy.
- Methods and means required for energy isolation and control.
- Purpose and use of the lockout/tagout procedures.
- Limitations of the use of tagout systems.

1.3.2 Affected Employees

An affected employee is defined as a person whose job requires him/her to operate or use a machine or equipment on which work activities are being performed under lockout or tagout, or whose job requires him/her to work in an area in which such activities are taking place. Affected employees do not attempt to restart or re-energize machines or equipment that are locked out or tagged out.

Authorized employees will receive training on the following topics:

- Purpose and use of the lockout/tagout procedures.
- Prohibition relating to attempting to restart or reenergize equipment that has been locked or tagged out.

1.4 Lockout/Tagout Procedure

Lockout/tagout procedures will be followed when working on or around machines, equipment, or any system where the unexpected energization or start-up of the machine or equipment or release of stored energy can cause injury to the employee.

GEI uses a red Master Lock® 1 31/32-inch high body high-visibility aluminum padlock, keyed differently, with a 1 1/16-inch shackle, or its equivalent for lockout activities. An employee's lock and tag must not be removed by anyone other than the employee who installed the lock and tag unless removal is accomplished under the direction of the CHSO.

When GEI employees are working on project sites where a group lockout is required, the locked-out device will first be secured using a folding scissors clamp that has many padlock holes capable of holding it closed. Each employee/subcontractor will apply their own padlock to the clamp. The locked-out device cannot be activated until all workers have signed off on their portion of the project and removed their padlock from the clamp. The lead contractor responsible for the group lockout will assign an authorized employee who has primary responsibility for the number of employees working under the protection of a group lockout or tagout device. GEI employees will not act as the Authorized Employee.

Only GEI employees who have completed lockout/tagout training may conduct a lockout/ tagout procedure. Normally GEI employees will follow the client's lockout/tagout procedures. If the client does not have specific lockout/tagout procedures to follow, use these guidelines at a minimum:

- Prior to conducting any lockout/tagout procedures, notify all affected employees.
- Identify the type, magnitude, and hazards of the energy that the machine/ equipment uses.
- Shut down the machine/equipment by the normal stopping procedure (stop button, open switch, close valve, etc.).
- Disconnect the machine/equipment from the energy source.
- Stored or residual energy (such as capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
- Using the correct type of lockout/tagout device, lockout the machine/equipment with an assigned individual lock by placing a lock on each energy isolating device. Only the employee performing the work should have a key to this lock.
- Locks can be obtained from the RHSO. This lock will have a GEI-approved tag that allows the employee to write their name and date on the tag.

- Lockout devices, where used, will be affixed in a manner that will hold the energy isolating devices in a safe or off position. Locking devices will always be used on energy isolating devices designed with the capability of being locked.
- Tagout devices, where used, will be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the safe or off position.
- Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close, and as safely as possible, to the device in a position that will be immediately obvious to anyone attempting to operate the device.
- Confirm that the machine/equipment has been disconnected by attempting to operate or turn the machine/equipment on. If the machine does not operate, it is now locked out.
- If, during repair or maintenance activities, the machine or equipment is required to be energized, identify the location of lockout/tagout device(s) that can be removed to accomplish this. Only the lockout/tagout devices absolutely necessary to allow the equipment or machine to be energized or partially energized should be removed. After the equipment or machine has been cycled or jogged, the lockout/tagout devices will be reapplied and the steps above will be repeated prior to commencing work.
- When the machine/equipment is ready to be returned to service, make sure all tools are removed and the system is operationally intact. Verify that all employees are in a safe position and have been removed from the area.
- Remove the lockout/tagout devices and reenergize the machine/equipment.
- Notify affected employees that the service or maintenance work is complete and the machine/equipment is ready for use.

1.5 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or supervisor/project manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will

conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health & Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.6 Limitations

Follow safety procedures as defined in the site-specific HASP at all times.

If lockout/tagout procedures are going to be performed by GEI employees or GEI subcontractors, the specific procedure will be reviewed the Safety Team, prior to any work being performed.

1.7 References

OSHA 29 CFR 1910.147 Appendix A – The control of hazardous energy (lockout/tagout)

1.8 Attachments

None.

1.9 Contact

Health&SafetyTeam@geiconsultants.com

1.10 Review History

- November 2016 (Separated from a previous SOP)

STANDARD OPERATING PROCEDURES

SOP No. HS-006 Excavations and Trenches

1.1 Objective

The objective of this Standard Operating Procedure (SOP) is to highlight the hazards and safety procedures when work activities include excavations and/or trenches. The following guidelines will be followed when excavations or trenches are present on GEI projects.

1.2 General

This SOP is intended for use by employees engaged in work on project sites that include trenching and/or excavation operations. The site-specific health and safety plan (HASP) must include a hazard assessment for the project that identifies the potential for trenching and excavation hazards and the control methods to be implemented by GEI employees. These hazards must be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

An “excavation” is any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

A “trench” (trench excavation) is a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.

Do not enter a trench or excavation without consulting with the Project Manager, Corporate Health and Safety Officer (CHSO), or Regional Health and Safety Officer (RHSO).

1.2.1 Personal Protective Equipment

Employees will be provided with the personal protective equipment (PPE) necessary to help protect them from the hazards of work activities related to excavations and/or trenches. All employees will wear a hard hat, steel toe or composite toe boots, and safety glasses at a minimum. In addition, face shields, gloves, fall protection and hearing protection may be required. PPE must be maintained in good condition, kept clean and properly stored when not in use. More information regarding PPE is located in Section 6 of GEI’s Corporate Health and Safety Program.

1.3 Hazards

Hazards associated with excavations and trenches can include collapse, falls, falling objects, hazardous atmospheres, and incidents involving mobile equipment. One cubic yard of soil can weigh as much as a car.

1.4 Entry

GEI employees will not enter trenches or excavations that do not comply with OSHA 29 CFR 1926.650. If a project requires GEI employees to enter a trench or excavation, the trench or excavation must meet the following requirements described in the following sections.

Do not enter a trench or excavation without consulting with the Project Manager, Corporate Health and Safety Officer (CHSO), or Regional Health and Safety Officer (RHSO).

1.4.1 Competent Person

The excavation must be inspected prior to the start of each shift by a competent person who most likely will work for the contactor performing the work. The competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions. GEI generally does not act as the competent person.

1.4.2 Soil Type

The competent person for the project will determine what the soil type is and what type of protective system will be implemented. The type of soil where the excavation or trench is being dug has significant influence on what type of protective system will need to be in place. There are four types of soil: stable rock, type A, type B, and type C. As you progress from stable rock to type C, the cohesive properties of the soil change the soil becomes less stable.

1.4.3 Protective System

A protective system is required for trenches or excavations greater than 5 feet in depth unless the excavation is made entirely in stable rock. In special situations the competent person may require a protection system for an excavation that is less than 5 feet deep. The competent person is responsible for assessing the soil type and the protective systems required for a specific trench when an excavation is less than 20 feet deep. If the excavation is greater than 20 feet in depth, the protection system requires a design by a registered professional engineer or based on tabulated data prepared and/or approved by a registered professional engineer.

The protective system will be designed based on soil type, depth of excavation, water level, loads adjacent to the excavation, changes in weather conditions, or other operations in the area. Protective systems can include sloping or benching of the sidewalls, shoring the sidewalls using an approved support system, or shielding workers with a trench box or other similar type of support.

The different types of protective systems include:

Benching is a method of protecting workers from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels of steps, usually with vertical or near vertical surfaces between levels. Benching cannot be done with Type C soil.

Sloping involves cutting back the trench wall at an angle inclined away from the excavation.

Shoring requires installing aluminum hydraulic or other types of support structures to prevent soil movement and cave-ins.

Shielding protects workers by using trench boxes or other types of supports to prevent soil cave-ins.

Designing a protective system can be complex because many factors must be considered: soil classification, depth of cut, water content of soil, changes caused by weather or climate, surcharge loads (e.g., spoil, other materials to be used in the trench) and other operations in the vicinity.

1.4.4 Access and Egress

Excavations and trenches greater than 4 feet in depth require a safe access and egress including ladders, steps, or ramps. These points of access and egress are to be no greater than 25 feet of lateral travel in any direction.

1.4.5 Atmospheric Hazards

Where oxygen deficiency (atmospheres containing less than 20.7% oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation will be tested before employees enter excavation.

1.5 Subcontractor Oversight

When GEI is overseeing excavation activities performed by a subcontractor, the following safety hazards should be monitored:

- Care must be taken not to create new hazards like narrow walkways along edges of an excavation.
- Heavy equipment must not be parked or working at the edge of the excavation.
- Spoils should not be stockpiled within 2 feet of the trench edges.
- Confirm with subcontractor that underground utilities have been located before any excavation or trenching activities begin (*refer to* SOP HS-014 Utility Mark-out).
- Confirm with the subcontractor that the excavation or trench has been tested for hazardous atmospheres before entering.
- Confirm with the subcontractor that the excavation or trench has been inspected by a competent person before each work shift and after any type of precipitation. If hazards are identified during this inspection, verify that the hazards are controlled prior to entering the trench or excavation.
- GEI employees will not work under raised or suspended loads.
- Excavations/trenches must be protected at the end of a work shift if they are to be left open. These trenches/excavations must be covered and a sign that reads "Hole" must be placed in a location that will notify anyone of the hazard. Or a secure barricade will need to be installed.

In circumstances where GEI employees are working on sites where a contractual agreement with the excavation contractor does not exist and we cannot confirm the above stated conditions, entry into trenches or excavations will not be conducted. Any safety concerns that arise should be communicated to the Project Manager and, if necessary, the client.

1.6 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened.

The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.7 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

Some states, including Massachusetts, require a trench permit prior to trenching or excavation activities. Verification of local requirements will be evaluated in the planning stage.

1.8 References

OSHA 29 CFR 1926.650 – Subpart P; *Excavations*
OSHA Construction eTool – http://www.osha.gov/SLTC/etools/construction/index.html
OSHA FactSheet Trenching and Excavation Safety – viewed on 9/13/2016
https://www.osha.gov/OshDoc/data_Hurricane_Facts/trench_excavation_fs.pdf

1.9 Attachments

None

1.10 Contact

Health&SafetyTeam@geiconsultants.com

1.11 Review History

- September 2016
- May 2014
- November 2013
- January 2011
- Initial Version Date Unknown

STANDARD OPERATING PROCEDURES

SOP No. HS-008a Non-Powered Hand Tools

1.1 Objective

This Standard Operating Procedure (SOP) is intended for use by employees working with non-powered hand tools. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the hazards associated with the non-powered hand tools that will be used. These hazards should be reviewed during the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.2 General

Misuse of hand tools accounts for the majority of accidents and injuries involving hand tools. Only use a tool for the task which it was designed for. If the right tool isn't available contact the Project Manager and discuss what is needed. Improper maintenance is another leading cause of injuries. Employees using hand tools may be exposed to a number of other potentially serious hazards: falling objects (i.e., objects can fall as a result of contact with tools or objects which are abrasive or splash), harmful dust, fumes mists, vapors, and gases, as well as contact with electrical power sources.

1.2.1 Condition of Tools

All hand tools, whether furnished by GEI or the employee, will be maintained in safe working condition. All hand tools must be inspected before use. Never use a tool if its handle has splinters, burrs, cracks, splits or if the head of the tool is loose. Never use impact tools such as hammers, chisels, punches or steel stakes having mushroomed (flattened) heads. Tag worn, damaged or defective tools "Out of Service" and do not use them; notify your Branch Manager or Project Manager so that the tool can be replaced or repaired. If the tools cannot be repaired they will be disposed of properly. GEI does not issue or permit the use of unsafe hand tools.

1.2.2 Personal Protective Equipment

Employees using hand tools will be provided with the personal protective equipment (PPE) necessary to protect them from the hazard of the tool as well as the associated hazards with using the tool. (i.e., projectile debris, dust, etc.). <u>All employees will wear work gloves, steel toe or composite toe boots, and safety glasses at a minimum</u>. In addition, face shields and hearing protection may be required. Most hand injures can be avoided with the proper use of PPE. PPE must be maintained in good condition, kept clean and properly stored when not in use. More information regarding PPE is located in Section 6 of GEI's Corporate Health and Safety Program.

1.2.3 General Safe Practices

Never wear sandals, open-toed or canvas shoes when working with tools. Always tie back long hair. Avoid loose-fitting clothes which might become entangled in a tool. Always remove rings and other jewelry. Make sure your grip and footing are secure when using large tools. Never carry tools up ladders; use a tool belt, hoist, or a rope. Use extra caution when using tools at heights – a falling tool could kill a co-worker. Always pass a tool to another person by the handle – never toss it to them. Never use a tool with hands are wet, oily, or greasy. Select ergonomically-designed tools for work tasks when movements are repetitive and forceful. Always make sure observers are at a safe distance. Always secure work with a vice, clamp, or other support.

1.3 Non-Power Hand Tools

Non-powered hand tools include anything from axes to wrenches. Even though the tool is powered by human inertia, injuries from improper use of non-powered hand tools often involve severe disabilities.

1.3.1 Knives

Only use a knife with a sharpened blade. Pull the knife through the object and away from your body; pulling motions are easier to manage. Never use a knife if its handle has splinters, burrs, cracks, splits or if the blade is loose. Knives should never be used as screwdrivers, pry bars, or can openers. Never pick up knives by their blades. Always carry knives with their tips/points toward the floor. Never carry knives, scissors, or other sharp tools in pockets. Never attempt to catch a falling knife. When not in use, knives should be stored in sheaths. Box cutters will be self-retracting.

1.3.2 Wrenches

Never use wrenches that are bent, cracked, badly chipped, or having loose or broken handles. Discard any wrench with spread or battered jaws; if the handle is bent; or if a wrench has broken or battered points and notify your Branch Manager so that a replacement can be made. Never slip a pipe over a single head wrench handle to increase leverage. Never use a shim to make a wrench fit. Pull on a wrench using a slow, steady motion. Do not use push force on a wrench; you could lose your balance if the wrench slips.

1.3.3 Screwdrivers

Always match the size and type of screwdriver blade to fit the head of the screw. Do not hold the work piece against your body while using a screwdriver. Never put your fingers near the tip of a screwdriver when tightening a screw. Never use a screwdriver to make a starting hole for screws. Never use a screwdriver as a chisel, pry bar, or nail puller. When performing electrical work, always use an insulated screwdriver. Never use a screwdriver to test the charge of a battery.

1.3.4 Hammers

Never use a hammer if your hands are oily, greasy or wet. Always check behind you before swinging a hammer. Use a claw hammer for pulling nails. Never strike nails or other objects with the "cheek" of the hammer. Do not strike a hardened steel surface, such as a cold chisel, with a claw hammer. Never strike one hammer against another hammer. Never use a hammer as a wedge or a pry bar.

1.3.5 Pliers

Never use pliers which are cracked, broken, or sprung. Never use pliers as a wrench or a hammer. Do not attempt to force pliers by using a hammer on them. Never slip a pipe over the handles of pliers to increase leverage. When performing electrical work, always use insulated pliers. When using diagonal cutting pliers, shield loose pieces of cut material from flying into the air by using a cloth or your gloved hand.

1.3.6 Snips

Never use snips as a hammer, screwdriver, or pry bar. Always wear safety glasses or safety goggles when using snips to cut materials. Always wear work gloves when cutting materials with snips. Keep the blade aligned by tightening the nut and bolt of the snips. Never use straight cut snips to cut curves. Always use the locking clip on the snips when you have finished using them. Never leave or store snips in the open position.

1.3.7 Hand Saws

Always keep handsaws sharp and free of rust to prevent them from binding or jumping. Never carry a saw by the blade. Always hold the work piece firmly against a work table. Keep control of saws by releasing downward pressure at the end of the stroke. Never use an adjustable blade saw such as a hacksaw, coping saw, keyhole saw, or bow saw, if the blade is not taut. Oil saw blades after each use. Never force the saw through the cut as this may cause the saw to buckle or fly out of the groove and cause injury.

1.3.8 Chisels

Only use sharpened chisels. Never use chisels having mushroomed (flattened) striking heads. Whenever possible, hold a chisel by using a tool holder. Clamp small work pieces in a vise and chip towards the stationary jaw of the vise. Chip or cut away from yourself and keep both hands in back of the cutting edge. Always wear safety glasses or a face shield.

1.3.9 Vise and Clamps

Never use a vise having worn or broken jaw inserts, or having cracks or fractures in the body of the vise. Position the work piece in the vise so the entire face of the jaw supports the work piece. When clamping a long work piece in a vise, support the far end of the work piece by using an adjustable pipe stand or saw horse. Never slip a pipe over the handle of a vise to increase leverage. Never use a C-clamp for hoisting materials. Never use a C-clamp as a permanent fastening device.

1.3.10 Jacks

A manufacture's rated capacity must be clearly marked on all jacks and all jacks must have a stop indicator. When using a jack, never exceed the capacity of the stop indicator. Jacks should be lubricated and inspected regularly. When setting up a jack, ensure the base is centered on a firm, level surface. The jack head should also be placed against a level surface. Lift force should be applied evenly. Put a block under the base of the jack when the foundation is not firm. If it seems likely the cap could slip, place a block between the jack cap and load. Immediately block the load after it is lifted.

1.4 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or supervisor/project manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health & Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.5 Limitations

Follow safety procedures as defined in the site-specific HASP or in the manufacturer's specifications. Appropriate PPE must be worn correctly to provide the intended level of protection. If a hand tool is being used that is not identified in this SOP consult the manufacturer's literature and contact the Safety Team so we can include the information in a future version of this SOP.

1.6 References

OSHA Standards for the Construction Industry, Subpart I
Risk Analytics, LLC Hand Tools Training, 2006

1.7 Attachments

None

1.8 Contact

Health&SafetyTeam@geiconsultants.com

1.9 Review History

- July 2016
- May 2014
- August 2011
- October 2010
- One revision date unable to be found

STANDARD OPERATING PROCEDURES

SOP NO. HS-009 Hazardous Substances Exposure Management

1.1 Objective

This Standard Operating Procedure (SOP) is intended to outline the steps GEI employees will take to identify potential hazards associated with exposure to hazardous substances, the risks associated with these hazards, and the proper controls to use to minimize exposure. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the potential of encountering a hazardous substance and the control methods to be implemented by GEI employees. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.2 General

A hazardous substance is any substance that has one or more of the following intrinsic properties:

- Explosiveness
- Flammability
- Ability to oxidize
- Human toxicity (acute or chronic)
- Corrosiveness (to human tissue or metal)
- Ecotoxicity (with or without bioaccumulation)
- Capacity, on contact with air or water, to develop one or more of the above properties

1.3 Hazard Identification

An initial identification of hazards should be done based on a review of available documents including lists of chemicals used on site, analytical data from soil, surface water, groundwater, air, spill history, site history, equipment on site, maps, photos, and a preliminary survey.

Once hazardous substances are identified the regulated exposure limits need to be identified. Each substance may have a state/federal exposure value for each of the following (if applicable):

Action Level – An airborne level, typically one-half of the permissible exposure limit (PEL) designated in Occupational Safety and Health Administration's (OSHA's) substance-specific standards, 29 CFR 1910, Subpart Z, calculated as an

8-hour time weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Ceiling Limit – The exposure limit a worker's exposure may never exceed.

Sampling and Analytical Error – A statistical estimate of the uncertainty associated with a given exposure measurement.

Short-Term Exposure Limit (STEL) – The average exposure to a contaminant to which a worker may be exposed during a short time period (typically 15-30 minutes).

Time Weighted Average (TWA) – The average exposure to a contaminant over a given period of time, typically 8 hours.

1.4 Risk Identification

Once the presence and concentrations of specific hazardous substances and health hazards have been established, the risks associated with these substances will be identified. GEI employees and GEI subcontractors who will be working on the site will be informed of risks that have been identified.

Risks to consider include, but are not limited to:

- Potential exposures exceeding the permissible exposure limits and published exposure levels
- Potential Immediately Dangerous to Life and Health (IDLH) concentrations
- Potential skin absorption and irritation sources
- Potential eye irritation sources
- Potential hazardous atmospheres, including oxygen deficiency and fire and explosion hazards

1.5 Engineering Controls, Work Practices, and Personal Protective Equipment for Employee Protection

Engineering controls, work practices, and personnel protective equipment (PPE) for substances regulated in OSHA Subpart G (Occupational Health and Environmental Control) and Subpart Z (Toxic and Hazardous Substances) will be implemented in to protect employees from exposure to hazardous substances and safety and health hazards.

1.5.1 Elimination/Substitution

The first control method should be to try and eliminate or substitute the hazards with a safer alternative. This is the most effective solution as shown is Figure 1 below. If you can remove the hazard than you no longer need to find a way to protect the employee

from it. Or you can substitute a different piece of equipment or chemical to use that doesn't pose the same hazard and doesn't create a new one.

1.5.2 Engineering Controls

Engineering controls implement physical change to the workplace, which eliminates/reduces the hazard on the job/task. Examples include:

- Change the process to minimize contact with hazardous chemicals
- Isolate or enclose the process
- Use of wet methods to reduce generation of dusts or other particulates
- General dilution ventilation
- Use of fume hoods

1.5.3 Administrative Controls (Work Practices)

Administrative controls establish efficient processes or procedures to help protect the employee. Examples of these are:

- Rotate job assignments
- Adjust work schedules so that workers are not overexposed to a hazardous chemical

1.5.4 Personal Protective Equipment

The use of PPE to reduce exposure to risk factors is the last line of defense. All other options should be exhausted before use of PPE. Examples of PPE are:

- Chemical protective clothing
- Respiratory protection
- Gloves
- Eye or hearing protection
- Steel toe boots

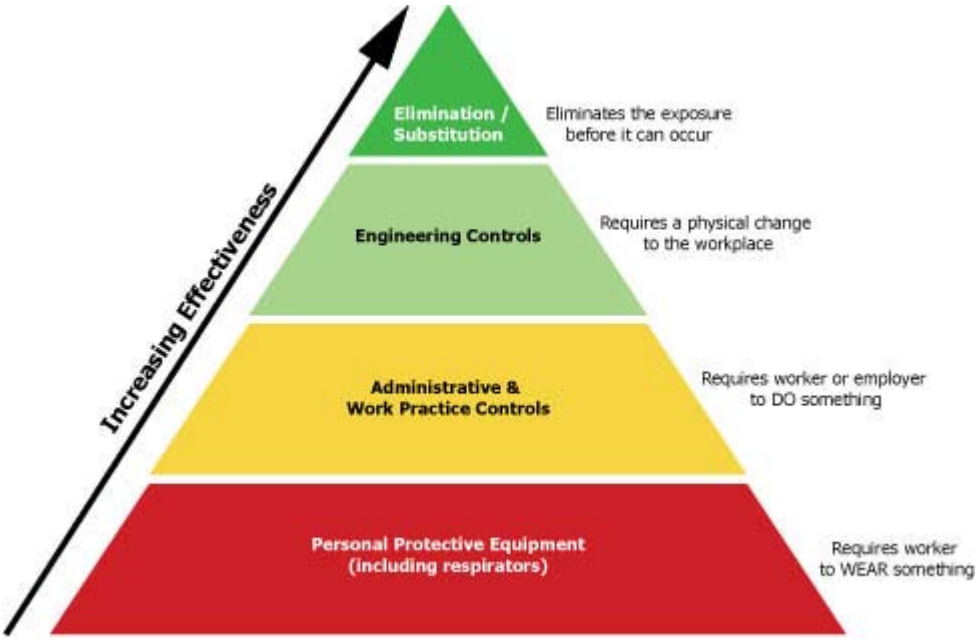


Figure 1: Hazard Mitigation Effectiveness Pyramid

1.5.5 Engineering Controls, Work Practices, and PPE for Substances Regulated in Subparts G and Subpart Z

Engineering controls and work practices will be instituted to reduce and maintain employee exposure at or below the PELs for substances regulated by 29 CFR Part 1910.

Engineering controls that may be feasible include the use of pressurized cabs or control booths on equipment, and/or the use of remotely operated material handling equipment. Work practices may include removing non-essential employees from potential exposure during opening of drums, wetting down dusty operations, and positioning employees upwind of potential hazards.

If engineering controls and work practices are not feasible, or not required, a reasonable combination of engineering controls, work practices, and PPE will be used to reduce and maintain at or below the PELs or dose limits for substances regulated by 29 CFR Part 1910, Subpart Z.

GEI will not implement a schedule of employee rotation as a means of compliance with PELs or dose limits except when there is no other feasible way of complying with the airborne or dermal dose limits for ionizing radiation.

The provisions of 29 CFR, subpart G, will be followed.

1.5.6 Engineering Controls, Work Practices, and Personal Protective Equipment for Substances Not Regulated in Subparts G and Subparts Z

An appropriate combination of engineering controls, work practices, and PPE will be used to reduce and maintain employee exposure to or below published exposure levels for hazardous substances and health hazards not regulated by 29 CFR Part 1910, Subparts G and Subparts Z. GEI will use published literature and Safety Data Sheets (SDS) as a guide in making the determination of what level of protection is appropriate for hazardous substances and health hazards for which there is no permissible exposure limit or published exposure limit.

1.5.7 Decontamination Procedures

Decontamination procedures will be developed, communicated to employees, and implemented before employees or equipment enter areas on site where potential for exposure to hazardous substances exists. Procedures will be developed to minimize employee contact with hazardous substances or with equipment that has contacted hazardous substances.

GEI employees leaving a contaminated area will be properly decontaminated; contaminated clothing and equipment leaving a contaminated area will be properly disposed of or decontaminated.

Decontamination procedures will be monitored by the site safety officer (SSO) to determine their effectiveness. When such procedures are found to be ineffective, the site safety officer will contact the Corporate Health and Safety Officer and appropriate steps will be taken to correct deficiencies.

Location
Decontamination will be performed in areas that will minimize the exposure to employees, equipment, and the environment.

Equipment and Solvents
Equipment and solvents used for decontamination will be decontaminated or disposed of properly.

Personal Protective Clothing and Equipment
Protective clothing and equipment will be decontaminated, cleaned, laundered, maintained, or replaced as needed to maintain their effectiveness.

Employees whose clothing comes in contact with hazardous substances will immediately remove that clothing and follow the directions on packaging or SDS sheet for how to properly clean the exposed area. The clothing will be disposed of or decontaminated before it is removed from the work zone.

Commercial Laundries or Cleaning Establishments
Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment will be informed of the potentially harmful effects of exposures to hazardous substances.

Showers and Changing Rooms
Where the decontamination procedure indicates a need for regular showers and change rooms outside of a contaminated area, these will be provided and meet the requirements of 29 CFR 1910.141 (Sanitation). If temperature conditions prevent the effective use of water, then other effective means for cleansing will be provided and used.

1.6 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health and Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.7 Limitations

None

1.8 References

OSHA 1910.120 Hazardous Waste Operations and Emergency Response
OSHA 1910 Subpart G Occupational Health and Environment Control
OSHA 1910 Subpart Z Toxic and Hazardous Substances
OSHA 1910.141 General Environmental Controls – Sanitation
http://www.business.govt.nz/worksafe/information-guidance/legal-framework/hsno-act-1996/defining-hazardous-substances/ (Viewed 7/8/2016)
https://www.osha.gov/SLTC/hazardoustoxicsubstances/ (Viewed 7/8/2016)
https://www.osha.gov/SLTC/hazardoustoxicsubstances/control.html (Viewed 7/11/2016)

1.9 Attachments

None

1.10 Contact

Health&SafetyTeam@geiconsultants.com

1.11 Review History

- July 2016
- May 2014
- November 2013
- August 2011 known as Hazard Identification and Management
- February 2011 known as HS-008 Contaminant Properties

STANDARD OPERATING PROCEDURES

SOP No. HS-010 Inclement Weather

1.1 Objective

This Standard Operating Procedure (SOP) is intended for use by employees engaged in work with the potential to be affected by inclement weather. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the potential for working in inclement weather and the control methods to be implemented by GEI employees. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.2 General

Employees should be aware of local weather conditions and monitor advisories issued by the National Weather Service and other local reporting services. Depending on location and season, storms are capable of producing heavy rain, floods, extreme temperatures, high wind conditions, lighting, tornados, and/or snowfall.

1.2.1 Heavy Rain

If working or driving in a rain storm, use extreme caution. When driving, turn your low beam lights on when the rainfall becomes heavy. Employees should be aware of the following:

- Heavy rain decreases visibility, especially when driving.
- Surfaces and tools become slippery.
- If you are working in the rain and your clothes become wet there is a risk of hypothermia when exposed to winds, even in warm temperatures.
- If the storms are going to produce thunder and/or lightning, leave the work area immediately and move to a safe area.
- Use your best judgment to determine if the rainfall becomes too heavy to continue working safely.

1.2.2 Lightning

Lightning can strike as far as 10 miles from the area where it is raining. That's approximately the distance you can hear thunder. **If you can hear thunder, you are within striking distance. Seek safe shelter immediately.** This can be within a building or vehicle. Wait 30 minutes after the last clap of thunder or flash of lightning before going outside again.

1.2.3 Flooding

Flooding may occur as a result of heavy rain in a short period of time. Flooding can be particularly acute in canyon areas where dry creek beds can turn into raging rivers from rainfall in distant or higher elevation areas. Be aware of this and your surroundings and move to a safe place if you begin to see signs that flooding may occur. Signs of potential flooding include sudden appearance of water in dry creek beds, increased water flow in rivers or streams, or quick rise in water levels.

Do not attempt to drive through areas or streets that are flooded. Seek alternate routes. Be particularly cautious at night when flooded areas are difficult to see. Urban flooding can stop traffic; increase the potential for traffic accidents; and can trap people in vehicles.

1.2.4 Extreme Temperatures

Work activities may take place in extreme heat or cold. Be prepared if these conditions are anticipated. Have the appropriate personal protective equipment (PPE) available; exercise proper fluid intake; and take breaks to prevent heat and cold stress. For more information about these conditions see the heat stress and cold stress programs found in GEI's Health and Safety Program.

1.2.5 High Winds, Tropical Storms, and Tornados

High Winds can be extremely dangerous. Appropriate measures will be taken to secure equipment and loose items when working in windy conditions. The project manager should be contacted about the weather conditions and, if necessary, work should be postponed.

Tropical storms are described as storms with sustained winds ranging from 39 to 73 miles per hour (mph) and hurricanes produce sustained winds that exceed 74 mph. When winds approach 40 mph (gale force winds) twigs begin to break off of trees and vehicles will veer off of the road. When winds approach 40 mph or the GEI employee feels unsafe based on the activities being performed, stop work and seek shelter as soon as possible. Blowing or falling debris and overhanging limbs/signs can be a significant hazard. If possible, avoid driving in these conditions; 70 percent of injuries during hurricanes are a result of vehicle accidents. Note that tall or elevated equipment will have manufacturer's safe operating wind speeds defined that could be less than 40 mph. The operator's manual should be consulted prior to operation of the equipment.

A tornado is a violent, dangerous, rotating column of air that is in contact with both the surface of the earth and a cumulonimbus cloud or, in rare cases, the base of a cumulus cloud. The Fujita Scale is used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure. Based on the Fujita Scale, or F-Scale, numbers begin at F0: 40-72 mph and go to F6: 319-379 mph (F6 is

generally theoretical). Nearly three-fourths of tornados are on the weak F0-F1 scale with just over two-thirds of deaths resulting from the violent F4-F5 tornados.

If a tornado is seen, stop work and seek shelter immediately. If a tornado siren is sounded move immediately to safety indoors and then move to a windowless interior space, basement, stairwell, or designated fall-out shelter. Windows should not be opened before an oncoming tornado. If there is no shelter available, seat belt yourself into your stationary vehicle or seek a depression or low spot on the land surface.

1.2.6 Snowfall and Ice Conditions

Working in the winter months may result in activities taking place during periods of snowfall or icy conditions. If you are working during or after snow has fallen, dress appropriately for the conditions. Snow and ice can cause working surfaces to become slippery. Clear snow and ice from work areas to prevent slip hazards. Use caution when performing snow or ice removal activities to prevent injuries. Driving in snowy and icy conditions is also hazardous. Reduce speed and use caution if you must drive in these conditions.

If the weather conditions deteriorate and you do not feel safe working in these conditions, stop work, move to a safe indoor location, and contact your project manager to let them know the weather, work conditions, and your location.

1.3 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.4 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection. Protection in extreme weather conditions can best be accomplished if the conditions are anticipated and actions are taken. Monitor local weather conditions prior to starting work.

1.5 References

Center for Disease Control and Prevention – Natural Disasters and Severe Weather
http://www.bt.cdc.gov/disasters/

National Lightning Safety Institute

NOAA, National Weather Service

Office of Climate, Water, and Weather Services

1.6 Attachment

None

1.7 Contact

Safety Team
Health&SafetyTeam@geiconsultants.com

1.8 Review History

- Previous revision dates were not documented
- May 2014
- July 2016

STANDARD OPERATING PROCEDURES

SOP No. HS-012 Noise Exposures

1.1 Objective

This Standard Operating Procedure (SOP) is intended for use by employees engaged in work with elevation noise levels. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the potential for work in loud environments and the control methods to be implemented by GEI employees. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.2 General

Working in loud environments can cause hearing damage and loss if the proper protection is not in place. The following procedures describe methods to mitigate unhealthy noise levels and protect hearing.

1.3 Hazard Identification

If projects involve noise levels above OSHA regulations, employees should take steps to remove the noise exposure. Common sources of elevated noise levels are heavy equipment, power tools, pumps, and generators. GEI has an established Hearing Conservation Program located in the GEI Health and Safety Program.

1.4 Risk Identification

Hearing protection is required if noise levels in a work area are known to be above 85 decibels (dB), which can be measured with a noise meter. When decibel levels are not known, hearing protection is required if you need to raise your voice to talk to someone standing within a normal speaking distance from you.

1.5 Mitigation

There are three options that can be used to help mitigate a noise hazard:

1.) Remove the hazard by taking away the source of the noise.

2.) Remove the employee from the source of the noise.

3.) Provide the employee with appropriate personal protective equipment (PPE).

The first option for employee protection is to remove the hazard by taking away the source of the noise or using engineering controls to reduce the level.

If this cannot be accomplished, the next control measure is to remove the employee from the source. This can be done by moving the work area to a quieter location or distancing the employee from the noise source. For example, GEI employees do not need to be standing next to an operating drill rig or other heavy equipment. By distancing themselves from heavy equipment or other noise sources the need for hearing protection can be eliminated/reduced.

The final option, if the above two options aren't feasible, disposable ear plugs that are made available to GEI employees are to be used. Additional means of hearing protection will be provided, such as ear muffs, if the disposable ear plugs are not adequate.

When using hearing protection, employees will need to make a greater effort to be aware of the surroundings which may include moving equipment, traffic, and other site hazards.

1.6 Proper Use of Hearing Protection

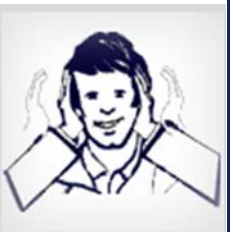
DISPOSABLE EAR PLUG FITTING INSTRUCTIONS

Before fitting any ear plugs, make sure your hands are clean.
Foam ear plugs are disposable and not intended for reuse.

Hold the ear plug between your thumb and forefinger. Roll and compress the entire ear plug to a small, crease-free cylinder. While still rolling, use your other hand to reach over your head and pull up and back on your outer ear. This straightens the ear canal, making way for a snug fit.

Insert the ear plug and hold for 20 to 30 seconds. This allows the ear plug to expand and fill your ear canal.

Test the fit. In a noisy environment, and with earplugs inserted, cup both hands over your ears and release. You should not notice a significant difference in the noise level. If the noise seems to lessen when your hands are cupped over your ears, your ear plugs are not fitted properly. Carefully remove the earplugs (see instructions below) and refit following instructions, above.



Always remove ear plugs slowly, twisting them to break the seal. If you remove them too quickly, you could damage your ear drum.

REUSABLE EAR PLUG FITTING INSTRUCTIONS

Before fitting any ear plugs, make sure your hands are clean.

Reusable ear plugs should be inspected and cleaned often in soapy water. If they become hard, torn, or deformed they should be discarded and replaced.

Reach around your head and pull up and back on your outer ear. This straightens out the ear canal, making way for a snug fit. Hold the stem end of the ear plug and insert it well inside your ear canal until you feel it sealing and the fit is comfortable.

Test the fit. In a noisy environment, and with ear plugs inserted, cup both hands over your ears and release. You should not notice a significant difference in the noise level. If the noise seems to lessen when your hands are cupped over your ears, your ear plugs are not fitted properly. Carefully remove the ear plugs (see instructions below) and refit following instructions, above.

Always remove ear plugs slowly, twisting them to break the seal. If you remove them too quickly, you could damage your ear drum.

1.7 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety

Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, People Team, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.8 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.9 References

OHSA 29 CFR 1910.95 – Occupational Noise Exposure

OHSA 29 CFR 1926.101 – Hearing Protection

Texas American Safety Company (TASCO)

1.10 Attachments

None

1.11 Contact

Health&SafetyTeam@geiconsultants.com

1.12 Review History

- June 2016
- May 2014
- November 2013
- February 2011
- November 2010

STANDARD OPERATING PROCEDURE

SOP HS-014 Utility Mark-out

1.1 Objective

This Standard Operating Procedure (SOP) provides guidance for utility mark-out procedures related to drilling, excavation, or other sub-surface or intrusive activities to avoid injury to GEI employees or property damage. This SOP is applicable when GEI is responsible for its operation or our subcontractor's operation for utility mark-out. A utility mark out is when paint, flags or other markers are put in place to identify the location of an underground utility.

Clients or local agencies may have additional requirements or procedures to mark out of utilities. If local utility mark-out procedures differ from those described within this SOP, applicable state or municipal regulations should be followed.

1.2 General

This SOP is intended for use by employees engaged in work with sub-surface or intrusive activities. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the potential for subsurface hazards and the control methods to be implemented by GEI employees. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.2.1 Contractor/GEI Responsibilities

- The contractor or GEI employee will pinpoint each exploration area with white paint, flags, or stakes. personal protection equipment (PPE), including eye protection when using spray paint will be worn.
- Exploration locations should be marked-out with sample identification number(s) and type of sample (e.g., boring, test-pit, or monitoring well).
- The contractor compiles information about the work areas on a request form specified by the state utility mark-out program and submits it. Work area location maps can be sent to the utility mark-out program to clarify locations.
- The mark-out program customer service representative will provide a mark-out ticket number and a list of utilities notified upon receipt of the request information. This information will be recorded on the GEI documentation form in Appendix B and/or in other project documents.
- If known, the contractor or GEI employee will also notify non-member utility operators (e.g., apartment complexes, commercial complexes, railroads with communication cables, etc.).

1.2.2 Utility Mark Outs

- Utility companies or their sub-contractors will only mark-out, or clear, utilities under their responsibility. Generally, this means that they will only mark-out utilities within the public right-of-way up to private property boundaries. Information needed to determine the location of utilities on private properties will be requested from the property owner. This may include available property drawings or as-built figures. If this information is not available, additional non-intrusive surveys of the property may be required by a private utility locator to find underground utilities by using techniques such as ground penetrating radar (GPR).
- American Public Works Association (APWA) Uniform Color Code For Marking Underground Utility Lines are:
    1. **White** – Proposed Excavation
    2. **Pink** – Temporary Survey Markings
    3. **Red** – Electric Power Lines, Cables, Conduit and Lighting Cables
    4. **Yellow** – Gas, Oil, Steam, Petroleum, and Gaseous Material
    5. **Orange** – Communications, Alarm, Signal Lines, Cables or Conduit
    6. **Blue** – Water
    7. **Purple** – Radioactive Materials
    8. **Green** – Sanitary and Storm Sewers and Drain Lines

1.2.3 Utility Mark Out Review

- Before the intrusive work activities begin, the contractor or GEI employee will verify that each utility company has completed a utility location for the work area or the location has been cleared by a private locator and record this on the mark-out request information sheet.
- A visual survey of the project area will be done prior to the start of intrusive activities. This visual inspection will be done to identify signs, manholes, utility boxes, or other evidence of an underground utility is present and has been considered.
- The contractor or GEI employee can begin work on the scheduled work date and time if the utility operators have responded, taking care to find and preserve markings that have been made.
- Completed clearance documentation will be located on the excavation site during excavation activities and kept in project files.

1.2.4 Excavations

- When excavating near a buried utility, observe the approximate location around that utility.
- If exposing a utility, proper support and protection must be provided so that the utility will not be damaged.
- If the excavation work requires significant spans of the utility to be exposed, it is the contractor's responsibility to support the infrastructure (to prevent sagging or collapse) as needed. Contact the utility operator for support, guidance, or assistance.
- When the excavation is complete, provide proper backfill for utilities that have been exposed.
- Take care not to damage the conduit or protective coating of a utility. If the damage occurs, leave the damaged utility exposed and immediately call the utility owner.
- If a gas line is encountered, everyone will be evacuated according to the site evacuation procedures and the contractor must notify police, fire, and emergency personnel. No attempt should be made to tamper with or correct the damaged utility. All site personnel are to evacuate to the site's predetermined meeting point or a location a minimum of 300 feet away from the incident location.
- If the contractor needs to dig within the approximate location of a combustible, hazardous fluid, or gas line (natural gas, propane or gasoline), soft digging is required (hand digging, vacuum extraction) to a maximum depth of 5 feet. The approximate location is defined as 24 inches on either side of the designated center line of the utility if the diameter is not provided or 24 inches from each outside edge if the diameter is provided.

1.3 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health & Safety Officer (RHSO).

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification and/or the receipt of the Incident Report Form, RHSO will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.4 Limitations

- Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.
- Mark-out notification time usually does not include holidays. Make sure holidays are considered and mark-out time is scheduled accordingly. Under no circumstances are intrusive activities allowed to be performed prior to the required mark-out.
- Do not use white paint if precipitation is eminent. Consider using stakes if snow is predicted.

1.5 References

Reference the website for the "Call Before You Dig – 811" for the utility mark-out agency for the state you working in prior to site work. If you have issues locating the appropriate agency, contact the Safety Team for assistance.

1.6 Attachments

Attachment A – Standard Utility Color Codes

Attachment B – GEI Utility Clearance Documentation Form

1.7 Contact

Health&SafetyTeam@geiconsultants.com

1.8 Review History

- June 2016
- May 2014
- November 2013
- February 2011
- November 2010

ATTACHMENT A

COLOR CODE FOR UTILITY MARKING

(BASED ON 'THE AMERICAN PUBLIC WORKS ASSOCIATION' RECOMMENDATIONS AND THE ANSI STANDARD Z-53.1 FOR SAFETY COLORS)

UTILITY	COLOR
PROPOSED EXCAVATION	WHITE
ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTING CABLES	RED
POTABLE WATER	BLUE
STEAM, CONDENSATE, GAS OR OIL COMPRESSED AIR	YELLOW
TELECOMMUNICATIONS, ALARM OR SIGNAL LINES, CABLES OR CONDUIT	ORANGE
TEMPORARY SURVEY MARKINGS	PINK
SEWER AND STORM DRAINS	GREEN
CHILLED WATER, RECLAIMED WATER, IRRIGATION AND SLURRY LINES	PURPLE
OTHER	LIGHT BLUE

ATTACHMENT B

Utility Clearance Documentation

Please print clearly. *For more room, use back of page.*

Client: _____

GEI Project Name & Number: _____

Site: _____

Excavation/Drilling Location ID: _____

Excavator/Driller: _____

GEI PM: _____ GEI Field Team Leader: _____

Utility Drawings Reviewed: _____

Provided By: _____ Reviewed By: _____

Utility Clearance Call Date: _____ Name of Utility: _____

Utility Clearance Call Date: _____ Name of Utility: _____

Utility Clearance Received from (utility & rep name): _____ Date: _____

Utility Clearance Received from (utility & rep name): _____ Date: _____

Company that completed clearance: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Metal Detector Survey (yes/no): _____ Drilling Location Cleared by: _____

Contractor Name: _____ Company Name: _____

Contractor Signature: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Private Location Clearance Required (yes/no): _____ Date: _____

Contractor Name: _____ Company Name: _____

Contractor Signature: _____ Date: _____

Methods used for utility location (i.e. GPR, electronic pipe location) _____

GEI Staff Responsible for Oversight: _____

Hand clearing Performed (yes/no): _____ Methods: _____ Date: _____

Contractor Name: _____ Company Name: _____

Contractor Signature: _____ Date: _____

GEI Staff Responsible for Oversight: _____

GEI Consultants, Inc. Representative (name & title): _____

GEI Consultants, Inc. Representative Signature: _____ Date: _____

Based upon the best available information, appropriate utility clearance procedures were performed for the invasive work specified. If client ordered site specific deviations from existing GEI utility clearance procedures, they are approved by the client signature below:

Client Representative (name & title): _____

Client Representative Signature: _____ Date: _____

Notes:

STANDARD OPERATING PROCEDURES

SOP No. HS-016 Traffic Hazard Management

1.1 Objective

The objective of this Standard Operating Procedure (SOP) is to prevent or limit the potential for GEI personnel to encounter traffic hazards during field activities.

1.2 General

This SOP is intended for use by employees engaged in work with the potential for traffic hazards. The site-specific health and safety plan (HASP) will include a hazard assessment for the project that identifies the potential for exposure to traffic hazards and the control methods to be implemented by GEI employees, including review or attainment of necessary permits, traffic control plans, and flagger/police detail requirements for the local jurisdiction. Routine checks of the work zone will be made to ensure there are adequate levels of protection. These hazards will be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.3 Traffic Hazard Management

Traffic Hazard Management is the process of identifying and managing the potential risks associated with the movement of traffic through, around, or past a work area. This Traffic Hazard Management SOP is designed to assist employees in identifying and managing these hazards. Work areas should be as safe as possible. It is the responsibility of GEI employees to follow the Traffic Hazard Management SOP and adhere to these safety standards. Safety is not negotiable.

Under no circumstances are GEI employees permitted to commence work in a situation that the employee believes or knows their health and safety, or the health and safety of others, is at risk.

Major risk factors for work site Traffic Hazard Management include:

- The speed of traffic moving through a work site.
- The distance and clearance between moving traffic, workers, vehicles and equipment, and over-head power lines.
- Traffic volume and vehicle composition.
- Nature and conditions at the work site and approaches to the work site.

- Other factors such as the time of day, sight distance, weather, presence of pedestrians, or cyclists, and the type of work being carried out.
- Other hazards in proximity to the work site (e.g., power lines, open excavations) that may have conflicting safety management measures that need to be considered when developing the HASP.

1.4 Site Preparation

The following management measures will be considered whenever working in traffic areas. In addition, remain aware of the amount of traffic around the working area. The work space should be large enough for the job to be completed safely. Check permit, traffic control plans, and flagger/police detail requirements for the local jurisdiction. Perform routine checks of the work zone to make sure there are adequate levels of protection.

1.4.1 Traffic Barriers and Warning Signs

GEI employees will comply with the U.S. Department of Transportation's (DOT) Manual on Uniformed Traffic Control Devices (MUTCD) and/or state regulations for temporary traffic barriers (cones, barriers) and sign placement when required for working in traffic areas. Clearly define the work site by placing traffic barriers around the work space to indicate the space that is needed to safely perform the work. The traffic barrier will help make the work site more visible to other workers, pedestrians, cyclists, and moving vehicles. Place traffic barriers in such a way as to give yourself and equipment adequate space to work within the barriers. OSHA suggests placing the first warning sign at a distance calculated to be 4 to 8 times (in feet) the speed limit (in MPH).

1.4.2 Adequate Light

Requirements for night conditions and work areas with poor visibility are similar to day requirements. However there are a number of additional things to consider, such as visibility of the work site to advancing traffic and sufficient lighting. OSHA requires lighting for workers on foot and equipment operators to be at least 5-foot-candles or greater.

Visibility of the work area can be increased by employing the following measures:

- Using parked vehicles hazard and flashing lights.
- Wearing reflective personal protective equipment (PPE), such as a safety vest, in good condition.
- Providing adequate lighting to illuminate the work area with lights positioned so that there is no glare to approaching drivers.
- Placing reflective advance warning signs and traffic barriers so that they are visible to road users.

1.4.3 Distance from the Nearest Traffic Lane

Work areas located along roadsides will have a minimum clearance as defined by DOT's MUTCD and/or state or local DOT regulations for traffic barrier and sign placement.

1.4.4 PPE

The proper PPE, as outlined in the project HASP, will be worn when appropriate. The color/type of safety vest will comply with site regulations.

1.5 Equipment Operation

Vehicles and heavy equipment operators should use a spotter when possible if it is necessary to drive in reverse to reduce risk of collision with oncoming traffic. If it is necessary to drive against the flow of traffic make sure this area is within the work zone and properly blocked off from oncoming traffic.

1.6 Pedestrian Safety

When working near pedestrian traffic, a safe alternate pedestrian route will be established. Refer to local regulations when establishing pedestrian walkways.

1.7 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health & Safety Officer (RHSO).

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the RHSO will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.8 Limitations

Follow safety procedures as defined in the site-specific HASP, federal DOT, and local jurisdictions. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.9 References

DOT's Manual on Uniformed Traffic Control Devices (2009 Edition)

Hazard Exposure and Risk Assessment Matrix for Hurricane Response and Recovery Work: https://www.osha.gov/SLTC/etools/hurricane/work-zone.html

1.10 Attachments

None

1.11 Contact

Health&SafetyTeam@geiconsultants.com

1.12 Review History

- November 2016
- May 2014
- November 2013
- August 2011
- October 2010 Initially HS-027 Traffic Hazards

STANDARD OPERATING PROCEDURES

SOP No. HS-018 Working Around Heavy Equipment

1.1 Objective

The objective of this Standard Operating Procedure (SOP) is to prevent or limit the physical hazards when working around heavy equipment.

1.2 General

This SOP is intended for use by employees engaged in work with the potential for working near heavy equipment. The project site-specific health and safety plan (HASP) should include a hazard assessment for working near heavy equipment to be implemented by GEI employees. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.3 Heavy Equipment Precautions

Heavy equipment (e.g., excavators, backhoes, drill rigs, etc.), can present many physical hazards that can result in serious injury or death if the proper safety precautions are not followed. The following is a list of precautions to be aware of when working around heavy equipment:

- Wear appropriate personal protective equipment (PPE), including at a minimum reflective, high-visibility safety vest, hard hat, safety glasses, and steel/composite toe boots.
- Always keep your distance from moving equipment.
- Do not assume the operator knows where you are or where you are going.
- Make sure to make eye contact and receive acknowledgement of your presence with the operator.
- Avoid working near heavy equipment, but if unavoidable, communicate your location with the operators. If using hand signals, discuss the signals with the equipment operator prior to starting work.
- Watch for moving equipment. Construction sites can have a lot of activity and equipment may be moving in an unpredictable manner.
- Do not rely on back-up or other alarms. They may not be working or you may not hear them with the noise of other activities taking place in the area.
- Stay out of the swing radius of cranes, excavators, or other equipment that swings or rotates.
- Do not walk beside a moving vehicle, the vehicle may turn, slip, or the load may shift causing the vehicle to go off course.
- Do not ride on the outside of a moving equipment.

- Never walk under or stand too close to a load suspended by cranes or hoists.
- Do not walk behind a piece of equipment that is backing up without acknowledgment from the operator it is safe to proceed. If working next to heavy equipment is unavoidable, be aware of the hazards including pinch points and moving parts. Use a spotter to watch the work area for moving equipment.
- If necessary, ask the operator to stop equipment operation to perform your work tasks.
- Verify the location and operation of emergency shut-off devices on the equipment.
- Be aware of the fuels and chemicals associated with the equipment. Have a spill prevention and response plan in place that includes the appropriate containment materials (i.e., spill kit).
- Do not wear loose fitting clothing when working around moving equipment (i.e., drill rig augers).
- Do not operate heavy equipment.
- Do not use cellular telephones near operating equipment.

1.4 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.5 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.6 References

OSHA 29 CFR 1926.600 – Subpart O; Motor Vehicles, Mechanized Equipment, and Marine Operations.

www.toolboxtopics.com/Construction/ (Viewed 10/16)

Caterpillar Safety – http://safety.cat.com/ (Viewed 10/16)

1.7 Attachments

None

1.8 Contact

Health&SafetyTeam@geiconsultants.com

1.9 Review History

- October 2016
- May 2014
- November 2013
- August 2011
- October 2010

STANDARD OPERATING PROCEDURES

HS-021 Mobile Equipment Operation

1.1 Objective

This program outlines safety requirements for GEI employees when operating mobile equipment.

1.2 General

This Standard Operating Procedure (SOP) is specific to mobile equipment that can be used by personnel to access environments that require an alternate vehicle to an automobile. Mobile equipment is defined as vehicles that are principally used off public roads. In other words, a type of vehicle that cannot be classified as an automobile. Examples of mobile equipment that employees currently use at GEI are mobile carts and all-terrain vehicles (ATV); other examples of mobile equipment are forklifts, earthmoving equipment, snow mobiles, etc.

The site-specific health and safety plan (HASP) will include a hazard assessment for the project that identifies the potential hazards for employees using mobile equipment and the control methods to be implemented by GEI employees. These hazards will be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.3 GEI Owned Mobile Equipment

When new mobile equipment is acquired by the company, the office in which it resides will be responsible for the care and maintenance. The branch manager will be responsible for verifying that a safety inspection check list is generated for the mobile equipment and that it is accessible to all employees. An initial safety check and test drive will be performed to make sure that the equipment is operating properly.

1.4 Third-Party Owned Mobile Equipment

If mobile equipment will operated by a GEI employee that is leased/rented from a third party or owned by a client, all available safety information will be reviewed. The equipment will be inspected upon receiving and the employee will follow, at a minimum, the safety requirements specified in this SOP. If the third party of client has additional safety training or requirements those will be included and reviewed, as an addendum, to the site specific HASP.

1.5 Safety Requirements

1.5.1 Inspection/Maintenance

At the beginning of each shift, the GEI operator will inspect the equipment and complete the safety inspection check list. Any malfunctioning of the equipment will be reported to the employees' supervisor and branch manager, and documented on the inspection sheet. If

equipment does not pass inspection, it will be tagged “Out of Service” and the branch manager will be notified so that it can be repaired or replaced.

1.5.2 Other Restrictions

Unauthorized personnel will not be permitted to ride on equipment unless it is equipped to accommodate passengers safely. The GEI operator will make sure the warning signal (if applicable) is operating when the equipment is backing up. The GEI operator will not operate mobile equipment without the protection of an enclosed cab or roof safety railing system. If neither of those are applicable approved eye protection will be worn. Before starting the engine, the GEI operator will ensure that all passengers have engaged their seatbelts (if available)...

1.5.3 Carrying Loads

The GEI operator will not use, or attempt to use any vehicle in any manner or for any purpose other than for which it is designated. The GEI operator will not load the vehicle/equipment beyond its established load limit and will not move loads which, because of the length, width, or height, have not been centered or secured for safe transportation.

1.5.4 Fuel Powered

The GEI operator of a gasoline or diesel vehicle will shut off the engine before filling the fuel tank and will verify that the nozzle of the filling hose makes contact with the filling neck of the tank. No one will be on or in the vehicle during fueling operations except as specifically required by design. Smoking or open flames will not be allowed in the immediate area during fueling operation.

1.5.5 All-Terrain Vehicle

Use caution when operating an ATV and follow the following recommendations:

- All ATV operators must complete a certified training program prior to riding. Most ATV manufacturers and the ATV Safety Institute offer training courses. When completed, a copy of the training certificate will be emailed to the People & Safety Team.
- At the beginning of each shift, the GEI operator will inspect the equipment and complete the safety inspection check list. Repair any defects noted during the inspection.
- All riders must ride within the limits of their skills and abilities. If there is any question whether a route can be safely traversed, find a safer route.
- Ride with others when possible. If you must ride alone a trip plan must be completed and left with the project manager. The trip plan will include at a minimum where you will be and for how long. If possible provide a map with your route. If cell phone coverage is not available or spotty, have a satellite phone, rescue beacon, and/or SPOT GPS device (contact your RHSO to borrow these) with you so that you can summon help if you need it.

- Read the operators manual provided by the manufacture before you ride and comply with its recommendations.
- Do not exceed the manufacturer's recommended maximum weight capacity for the ATV rack(s) and tow hitch.

1.6 Personal Protective Equipment

At a minimum personal protective equipment (PPE) for employees operating mobile equipment will includes safety glasses and high visibility reflective clothing. Additional PPE might include hard hat, gloves, and steel toed/shank safety boots. Clients might also have specific requirements for color of hard hats, types of reflective clothing. These requirements will be incorporated into the site-specific HASP.

1.7 Training Requirements

Only authorized employees will be allowed to operate mobile equipment. Authorization to operate mobile equipment will be issued to employees qualifying under appropriate training and proficiency testing. Training courses must be approved by the Corporate Health and Safety Officer (CHSO). Copies of certificates at the completion of the training will be emailed to the People & Safety Team.

When operating mobile equipment on a project site, copies of the training certificates for the operators will be maintained in an appendix of the site specific HASP.

1.8 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or supervisor/project manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The CHSO will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.9 Limitations

Not every type of equipment that can be classified as mobile equipment is identified specifically in this SOP. The safety information provided by the manufacture will be reviewed and followed. Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.10 References

29 CFR 1926.20 (General Safety and Health Provisions)

29 CFR 1926.21 (Safety Training and Education)

29 CFR 1926.602 (Material Handling Equipment)

International Risk Management Institute, Inc. (IRMI) Craig F. Stanovich December 2002, viewed on 11/8/2016:
https://www.irmi.com/articles/expert-commentary/auto-versus-mobile-equipment-in-the-cgl

1.11 Attachments

None

1.12 Contact

Health&SafetyTeam@geiconsultants.com

1.13 Review History

- November 2016
- May 2014
- November 2013
- July 2012

STANDARD OPERATING PROCEDURES

SOP No. HS-025 Manual Lifting

1.1 Objective

The purpose of this Standard Operating Procedure (SOP) is to identify and reduce potential work-related musculoskeletal disorder (WMSD) hazards. The SOP is intended to comply with state regulations and safe work practices developed by the Occupational Safety and Health Administration (OSHA). Modifications to meet these requirements will be made to this program as changing laws or regulations dictate.

1.2 General

Lifting heavy items is one of the leading causes of injury in the workplace. Overexertion and cumulative trauma when lifting are significant factors for injuries. When employees use smart lifting practices and work in their “power zone”, they are less likely to suffer from back sprains, muscle pulls, wrist/elbow/spinal and other injuries caused by lifting heavy objects. Common things to consider prior to lifting an object are: weight of the object, awkward postures, high-frequency and long duration lifting, inadequate handholds, and physical/environmental factors.

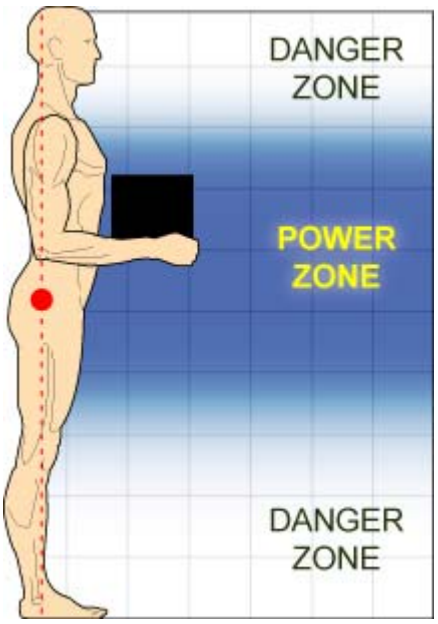


Figure 1: Lifting Power Zone

1.3 Safe Lifting Guidelines

The following safe lifting guidelines will be followed by employees involved in manual lifting activities:

- Before manual lifting is performed, a hazard assessment must be completed. The assessment must consider size, bulk, and weight of the object(s), if mechanical lifting equipment is required, if two-man lift is required, whether vision is obscured while carrying and the walking surface and path where the object is to be carried.
- Get a co-worker to help if equipment or other item is too heavy to lift.
- If possible, use powered equipment instead of manually lifting heavy materials. Lifting equipment such as dollies, hand trucks, lift-assist devices, jacks, or carts can be provided for employees.
- Reduce lifts from shoulder height and from floor height by repositioning the shelf or bin to closer to the power zone.
- Make sure walkways are clear of tripping hazards before moving materials.
- Use your legs and keep your back in a natural position while lifting. Keep the load close to your torso.

- Test the load to be lifted to estimate its weight, size, and bulk and to determine the proper lifting method.
- Do not twist while carrying a load. Instead, shift your feet and take small steps in the direction you want to turn.
- Make sure there are appropriately marked and sufficiently safe clearances for aisles and at loading docks or passageways where mechanical-handling equipment is used.
- Properly stack loose or unboxed materials which might fall from a pile by blocking, interlocking, or limiting the height of the pile to prevent falling hazards.
- Bags, containers, bundles, etc. should be stored in tiers that are stacked, blocked, interlocked, and limited in height so that they are stable and secure to prevent sliding or collapse.

- Storage areas should be kept free from accumulation of materials that could lead to tripping, fire, or explosion.
- Work methods and stations should be designed to minimize the distance between the person and the object being handled.

Supervisors should periodically evaluate work areas and employees' work techniques to assess the potential for and prevention of injuries. New operations should be evaluated to engineer out hazards before work processes are implemented.

1.4 Regulations

OSHA does not have a standard which sets limits on how much a person may lift or carry. They do however state that lifting loads heavier than about 50 pounds will increase the risk of injury.

The National Institute for Occupational Safety and Health (NIOSH) has developed a mathematical model that helps predict the risk of injury based on the weight being lifted and other criteria. The NIOSH model is based on previous medical research into the compressive forces needed to cause damage to bones and ligaments of the back. The mathematical model is incorporated in the *Applications Manual for the Revised NIOSH Lifting Equation*, which can be found on the NIOSH website (http://www.cdc.gov/niosh/docs/94-110/). It should be noted, however, that this NIOSH document provides only voluntary guidelines.

If there is a situation that arises where an employee is required to perform manual lifting on a reoccurring basis, the NIOSH Lifting Equation will be used to determine the appropriate weight that employee can safely lift. The lifting equation establishes a maximum load of 50 pounds for employees that are less likely to have to lift something, and don’t have to do any long distance travel or maneuvering of the item. This 50 pounds is then adjusted to account for:

- how often the employee is lifting
- twisting the back during lifting
- the vertical distance the load is lifted
- the distance of the load from the body
- the distance the employee must move while lifting the load
- how easy it is to hold onto the load

GEI uses 50 pounds as a standard. However each individual should not attempt to carry loads heavier than they can safely manage.

1.5 Training

Training will include general principles of ergonomics, correct manual lifting techniques to avoid musculoskeletal injuries, recognition of hazards and injuries, procedures for reporting hazardous conditions, and methods and procedures for early reporting of injuries.

1.6 Lifting Assistance

If employees are assigned a task that involves repetitive lifting and carrying of equipment the Safety Team and Project Manager should be contacted to conduct an ergonomic evaluation. The task should be discussed to determine if there is an alternative method that can be used. The alternative method should institute an engineering or administrative control to reduce/limit the amount of lifting that is required of the employee. Some examples include providing smaller containers to reduce the weight of what needs to be lifted; providing a device that helps carry awkwardly-shaped objects easier; or using a winch, fork lift, or other device to lift the item(s) for the employee.

1.7 Injury Reporting

Injuries experienced during manual lifting activities should receive prompt medical attention. If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health and Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health & Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future musculoskeletal injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.8 Limitations

Follow safety procedures for manual lifting.

1.9 References

OSHA Technical Manual (OTM), Section VII: Chapter 1 - Back Disorders and Injuries
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=29936 (Viewed 7/12/2016)
https://www.osha.gov/SLTC/etools/electricalcontractors/materials/heavy.html (Viewed 7/12/2016)

1.10 Attachments

None

1.11 Contact

Health&SafetyTeam@geiconsultants.com

1.12 Review History

- July 2016
- August 2014

STANDARD OPERATING PROCEDURES
SOP NO. HS-026 Hazard Identification and Management

1.1 Objective
This Standard Operating Procedure (SOP) is intended to outline the steps GEI employees will take to identify potential hazards on site, the risks associated with these hazards, and the proper engineering controls, work practices, and personal protective equipment (PPE) to use to minimize the associated risks.

1.2 Hazard Identification
Establishing proper work procedures by conducting a job hazard analysis will should be performed for all projects involving field work. An initial identification of hazards will be completed based on past and current property usage of the site, what tasks are required to perform the job, what equipment is needed to complete the assigned tasks, what hazards are in the working area etc.

The site-specific health and safety plan (HASP) will include a hazard assessment for the project that identifies the potential hazards and how to alleviate the hazard. These hazards will be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.3 Risk Assessment
A risk assessment will be performed for all aspects of field work. This analysis is to determine the quantitative or qualitative value of risk related to a tangible situation and a recognized hazard. Identification, studies, and monitoring of any hazard to determine its potential, origin, characteristics, and behavior are examples of what could be included and performed during a risk assessment. The assessment will increase awareness of workplace hazards and provide an opportunity to identify and control workplace hazards.

1.3.1 Assessment Guidelines
It is necessary to consider certain general guidelines for assessing the foot, head, eye and face, and hand hazard situations that exist in an occupational operation or process, and to match the protective devices to the particular hazard.

Assessments should be conducted:

- Prior to starting any work at the site
- As conditions change
- Workplace layout changes
- Environmental changes
- Process changes

- Yearly or other pre-determined interval

1.3.2 Hazard Sources

Some examples of hazard sources include but are not limited to:

- Items, materials, or machinery in motion
- Extreme temperatures
- Chemical exposures
- Harmful dust
- Light radiation
- Falling objects or potential from dropping objects
- Sharp objects
- Rolling or pinching objects
- Layout of workplace and location of co-workers
- Electrical hazards
- Noise exposures
- Confined spaces
- Working near or on water
- Fall hazards
- Traffic or other activities taking place on the site
- Air quality issues

1.4 Prevention – Control Methods

Control methods should be considered in the following hierarchy:

- Elimination
- Substitution
- Engineering Controls
- Administrative Controls
- Personal Protective Equipment

1.4.1 Elimination and Substitution

Elimination and substitution, while most effective at reducing hazards, also tend to be the most difficult to implement in an existing process. If the process is still at the design or development stage, elimination and substitution of hazards may be inexpensive and

simple to implement. For an existing process, major changes in equipment and procedures may be required to eliminate or substitute for a hazard. Employees should work with the Safety Team to find solutions.

1.4.2 Engineering Controls

Engineering controls are used to remove a hazard or place a barrier between the work and the hazard. It's implemented to control the hazard at the source. Examples may include machine guards, sound deading/dampening panels, traffic barriers, guardrails, and shields.

1.4.3 Administrative Controls

Administrative controls change the work procedures such as programs, schedules, and supervision to reduce employee exposure to hazards. The controls are frequently used with existing processes where hazards are not particularly well controlled. Examples of administrative controls are requiring frequent breaks or implementing a specific method to perform a task.

1.4.4 Personal Protective Equipment Selection

To select the proper PPE, the potential hazards must be known. The protective equipment selected must ensure a level of protection *greater than* the minimum required in order to help protect employees. The user must be supplied with a properly fitting protective device and given instructions on care and use. Users must be aware of all warning labels for and limitation of the PPE. Employees must be aware that the PPE does not eliminate the hazard.

1.4.5 Hazard Re-Assessment

As necessary, the workplace should be re-assessed for hazards by identifying and evaluating new equipment and processes, reviewing accident records, and re-evaluating the suitability of previously selected PPE. Re-assessment should occur at a defined regular schedule interval.

1.5 Job Safety Analysis

A job safety analysis (JSA) sometimes referred to as a job hazard analysis (JHA) or an activity hazard analysis (AHA) is the breaking down of any method or procedure into its component parts to determine the hazards connected with each key step and the requirements for performing it safely.

When a JSA is being created, make sure it isn't too general where the resulting information is not enough to assess the hazard and select proper controls, and be careful not to add unnecessary steps.

1.6 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threating, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health & Safety Officer (RHSO).

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the RHS) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.7 Limitations

Limitations may arise on a project specific basis and will be addressed as they arise.

1.8 Attachments

None.

1.9 References

Risk Analytics, LLC Hazard Assessment Training Program, January 2011

1.10 Contact

Health&SafetyTeam@geiconsultants.com

1.11 Review History

- November 2016
- June 2015

Appendix F

National Grid, Safety Procedure – COVID-19 Health & Safety Plan (A116)

FORWARD

National Grid's vision is to be a world-class safety organization, with zero injuries every day. A critical component of achieving this vision is the careful development, implementation and maintenance of safety procedures. This guidance document, COVID-19 Health and Safety Plan, describes pandemic response measures, taken by National Grid, to help prevent the spread of COVID-19.

Questions regarding this guidance should be referred to National Grid's Safety Department.

Record of Change

Revision	Date	Description
Initial	04/28/2020	Initial creation
1	5/6/2020	Updated Job Brief Checklist to reflect current face covering requirements, vehicle cleaning guide correction
2	5/27/21	Updated face covering guidelines

Table of Contents

1.0 SCOPE OF HEALTH & SAFETY PLAN 3

2.0 PROJECT PERSONNEL 3

2.1 Roles and Responsibilities 3

3.0 COVID-19 PANDEMIC RESPONSE MEASURES 4

3.1 COVID-19 Symptoms 4

3.2 Hygiene and Social Distancing 5

3.3 COVID-19 PPE and Face Coverings 5

3.4 COVID-19 Virus Risk Assessment and Adopted Measures 6

4.0 COVID-19 REPORTING PROCESS 6

4.1 COVID-19 Job Brief Checklist 6

4.2 COVID-19 Incident Reporting 6

1.0 SCOPE OF HEALTH & SAFETY PLAN

National Grid has developed this Health & Safety Plan (HASP) to uniformly apply pandemic response measures to help prevent the spread of the COVID-19 virus. National Grid field personnel and crews have been provided this information and communications.

2.0 PROJECT PERSONNEL

2.1 Roles and Responsibilities

National Grid shall be responsible for the safety of all its employees and shall ensure COVID-19 pandemic measures are in place. Key National Grid personnel are as follows:

Incident Command Structure

The National Grid Incident Command Structure (ICS) has been activated within all Business Units of National Grid's US Operations to respond to the COVID-19 pandemic. Members of the ICS review and approve all operational decisions, with the Incident Commander ultimately responsible for these decisions. The Incident Commander relies upon subject matter experts within the ICS, including the Operations Officer, the Safety and Health Officer, to help set standards and guidance for protective measures to be used to limit the spread of the COVID-19 virus. These Officers, in turn, utilize the expertise of other members of the organization within Operations, Safety, and Health, to assess risks associated with the work being performed and provide guidance on the most effective measures to be used by employees to protect themselves, their coworkers, our customers, and members of the public.

Field Supervisor

The Field Supervisor shall have the responsibility for monitoring and enforcing National Grid COVID-19 pandemic measures and shall ensure that all employees have received and reviewed this Health & Safety plan.

- Serve as the appointed supervisor to oversee field personnel and ensure pandemic measures are being followed
- Ensure field personnel have the appropriate pandemic supplies
- Disseminate all new National Grid COVID-19 communications to all field employees
- Where non-compliance is observed, take prompt corrective action; and
- Have the authority to order a safety stop in the event of a serious safety issue.

Crew Leader

The National Grid crew leader shall be in charge of the day-to-day details of the work to be performed. They shall ensure that work is performed in accordance with National Grid COVID-19 pandemic measures. They will:

- Walk the job site at the start of each day to ensure a safe work environment;
- Where non-compliance is observed, take prompt corrective action; and
- Have the authority to order a safety stop in the event of a serious safety issue.
- Perform the daily job safety briefing before commencing work, whenever a visitor arrives to the job site, and if there is a significant change in the work or when an extended break occurs. As part of the COVID-19 pandemic response, the COVID-19 job brief checklist (Appendix A) shall be used in addition to the applicable departmental job brief form.

Employees

National Grid employees are responsible for following all COVID-19 pandemic measures;

- Each employee is responsible for reporting to supervision any symptoms of COVID-19, of any direct contact with an individual confirmed to have COVID-19, or in contact with a person in quarantine.
- Each employee is obligated to call a safety stop when a hazardous condition is observed.
- All lone workers shall conduct a self-assessment utilizing the COVID-19 job brief checklist (Appendix A) and adhere to the guidance outlined in this plan.

National Grid Field Safety Representative

National Grid Field Safety Representatives conduct routine and random crew visits to National Grid job sites. The National Grid Field Safety Department shall act as a resource for National Grid field personnel to effectively implement this COVID-19 Health & Safety Plan and will be available on an as-needed basis for inquiries related to this HASP.

3.0 COVID-19 PANDEMIC RESPONSE MEASURES

3.1 COVID-19 Symptoms

COVID-19 Symptoms may include the following:

- Fever
- Cough

- Shortness of Breath
- Chills
- Repeated shaking with chills
- Muscle Pain
- Headache
- Sore Throat
- New loss of taste or smell

3.2 Hygiene and Social Distancing

- Wash your hands often with soap and water for at least 20 seconds, especially after using the restroom, before eating, and after blowing your nose, coughing, or sneezing. Hand washing is the best way to prevent the spread of viruses.
- If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are visibly dirty.
- **Proper hand washing/sanitizing products will be provided to all employees**
- Maintain a minimum of 6' social distance from other employees on site while performing work and during routine breaks. When work tasks prevent this, ensure proper face coverings are continued to be worn and proper hygiene
- Avoid touching your eyes, nose, and mouth.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Clean and disinfect frequently touched objects and surfaces using a disinfecting cleaning spray or wipe; if not available, use a soap and water solution.
- All cleaning product trash and potentially contaminated PPE will be stored in a trash bag and immediately disposed of at a National Grid facility at the end of each shift. Trash should not accumulate in any National Grid vehicle. Immediately wash hands upon disposing of trash bag.

3.3 COVID-19 PPE and Face Coverings

Effective June 1, 2021, National Grid will be revising its <u>outdoor face covering</u> policy to align with recent state guidelines and CDC recommendations. All other COVID protocols, including those related to indoor face covering requirements, will remain in place. The Company will continue to monitor federal and state guidance and will revisit the remaining protocols within 30 days.

Outdoors:
Face coverings will **<u>not</u>** be required outside in public for **fully vaccinated persons** or **where 6 ft socially distancing** can be accomplished. Employee that prefer to continue to mask- up even if fully vaccinated are encouraged to do so.

Indoors:
Face coverings are required inside National Grid facilities and must be worn upon entry. They can be temporarily removed while seated and working alone at a desk/cubicle with 6 ft of distance from

others. Face coverings must be put back on when standing up, moving about or when a coworker is standing or walking in their vicinity. Face coverings can also be removed when an employee is working alone in an enclosed room with a door, such as an individual office. Face coverings cannot be removed in enclosed spaces, including individual offices, conference rooms, training rooms, huddle rooms, storm rooms, locker rooms or any other such space when occupied by more than one person, regardless of ability to social distance within the room.

3.4 COVID-19 Virus Risk Assessment and Adopted Measures

National Grid's prescribed measures (work practices, PPE, hygiene) were selected based upon the risk assessments completed by subject matter experts and reported up through the ICS for approval. They are based upon the Centers for Disease Control & Prevention (CDC) and OSHA guidance, as well as input from Operations, Safety, and Health team members. They are believed to address all risks posed to our workforce, as well as to our customers and members of the public, when jobs are conducted in public places. These measures are reviewed on a continuous basis, for both effectiveness and to ensure the latest guidance is incorporated, with changes made, as necessary, after these reviews.

4.0 COVID-19 REPORTING PROCESS

4.1 COVID-19 Job Brief Checklist

In addition to the applicable departmental job brief form, all crew leaders shall utilize the COVID-19 job brief checklist to facilitate crew discussion regarding symptoms of COVID-19 and allow for discussion to help facilitate the reporting of a COVID-19 incident. All visitors to the job site will be required to have the job brief and COVID-19 checklist reviewed with them by the crew leader prior to entry on the job site.

Remember to maintain social distancing while conducting the job brief

4.2 COVID-19 Incident Reporting

To ensure the safety of all employees and the public, any employee shall immediately contact their Supervisor and National Grid Employee Services if one of the following conditions occur:

- Employee is exhibiting symptoms of COVID-19
- Employee has been in close contact of another individual with COVID-19
- Employee has been in close contact of another individual who is currently being quarantine for a suspected case of COVID-19

Close contact is defined as being within 6' of a sick/quarantined individual for more than 15 minutes.

Please refer to the COVID-19 Suspected/Confirmed Positive Process guidance document in Appendix A.

Appendix A – National Grid COVID-19 Communications

A Message from John Bruckner

National Grid US Coronavirus Incident Commander

Updated Guidance on Face Coverings

April 16, 2020

The state of New York and the state of Rhode Island recently issued executive orders requiring all essential employees who are working in public places to wear face coverings when distance from the public or co-workers cannot be maintained. As a result, we are updating our company policy to align safety standards for all employees.

We had previously communicated that wearing a face covering was voluntary based on CDC recommendations. We are now **requiring** National Grid employees to wear face coverings in the situations below. Please note that this applies to both **office** and **field-based** employees, and applies across **all jurisdictions**.

Face coverings must be worn:

- ✓ When working in public places
- ✓ When working in a customer's premises
- ✓ When social distancing is not able to be maintained with a co-worker, customer or member of the public in a National Grid facility, barn/yard, work location or company vehicle.

- This directive is effective at 8:00 pm this evening for all New York employees.
- It is effective starting this Saturday for all Rhode Island and Massachusetts employees.
- If you are working from home, our company guidance remains: If you can work from home, you should.

What qualifies as a face covering?

Employees may use either a company-issued or a personal face covering, depending on preference and availability. These include:

- Disposable masks, which need to be changed daily or if significantly dirty.
- Reusable FR Balaclavas, which need to be laundered daily, according to CDC cleaning guidance.
- Reusable FR neck warmers, which need to be laundered daily, according to CDC cleaning guidance.
  - Please note: Face pieces must be made from Flame Resistant (FR) material if they are worn when working in an energized zone or there is potential for a gas ignition.

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How to get a face covering:

Our procurement and warehouse teams are working directly with teams to ensure a steady supply of face coverings.

It is our intention to provide company-supplied face coverings widely, but in instances where one is not available or preferred, a personal covering may still be used.

Operations teams should work through their normal channels to order face coverings. We will be providing further guidance to office-based colleagues on where they can access face coverings.

CDC guidance on personal face coverings can be found here:

- https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html
- https://www.cdc.gov/coronavirus/2019-ncov/downloads/DIY-cloth-face-covering-instructions.pdf

Face coverings should:

- Fit snugly but comfortably against the side of the face
- Be secured with ties or ear loops, if provided
- Include multiple layers of fabric
- Allow for breathing without restriction
- Be removed from behind head or ears to minimize hand contact with face
- Be laundered and machine dried if reusable

Cleaned, dried coverings can be kept in a clean plastic bag until needed for use

It is important to note that face coverings, whether company-issued or personal, are not a substitute for taking measures that are known to be effective in stopping the spread.

Handwashing, and maintaining a social distance of 6 feet apart from others remains the most critical guidance that we can follow.

Sincerely,

John Bruckner

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COVID-19 Job Brief Checklist

Please Distribute

During this trying time it is important that we maintain our same level of focus at work locations conducting hazard assessments and identifying risks prior to the start of each task. Prior to beginning work at every location, when conditions, job focus or crew members change, after each meal period and after any prolonged interruption to the work, a **Job Briefing** shall be held.

The work to be performed shall be discussed and assigned, and the safety aspects of the job shall be reviewed. The National Grid protocol to screen all individuals to determine who may have been exposed to COVID-19 outside of work **must be reviewed** at the start of the workday and Job Briefing.

(Employees working alone shall conduct a self-assessment to determine if they may have been exposed to COVID-19 outside of work or should their condition change during the workday)

The questions are:

- ☐ Are you feeling ill in any way? For instance, do you have any of the following symptoms: A fever? A cough? Shortness of breath? Chills? Repeated shaking with chills? Muscle pain? Headache? Sore throat? New loss of taste or smell?
- ☐ Have you had close contact with a symptomatic person (e.g., fever, cough, and/or shortness of breath, chills, repeated shaking with chills, muscle pain, headache, sore throat, new loss of taste or smell) within the last 14 days?
- ☐ Have you had close contact with a person who was tested with results pending or positive for coronavirus within the last 14 days?
- ☐ Have you recently been out of state for non-work related travel (within the last 14 days)?

*Employees who answer **"YES"** to any of these questions must distance themselves from others, not enter the work area, and immediately contact their supervisor privately for further instruction.*

The employee must also contact the National Grid Employee Services Hotline 1-888-483-2123.

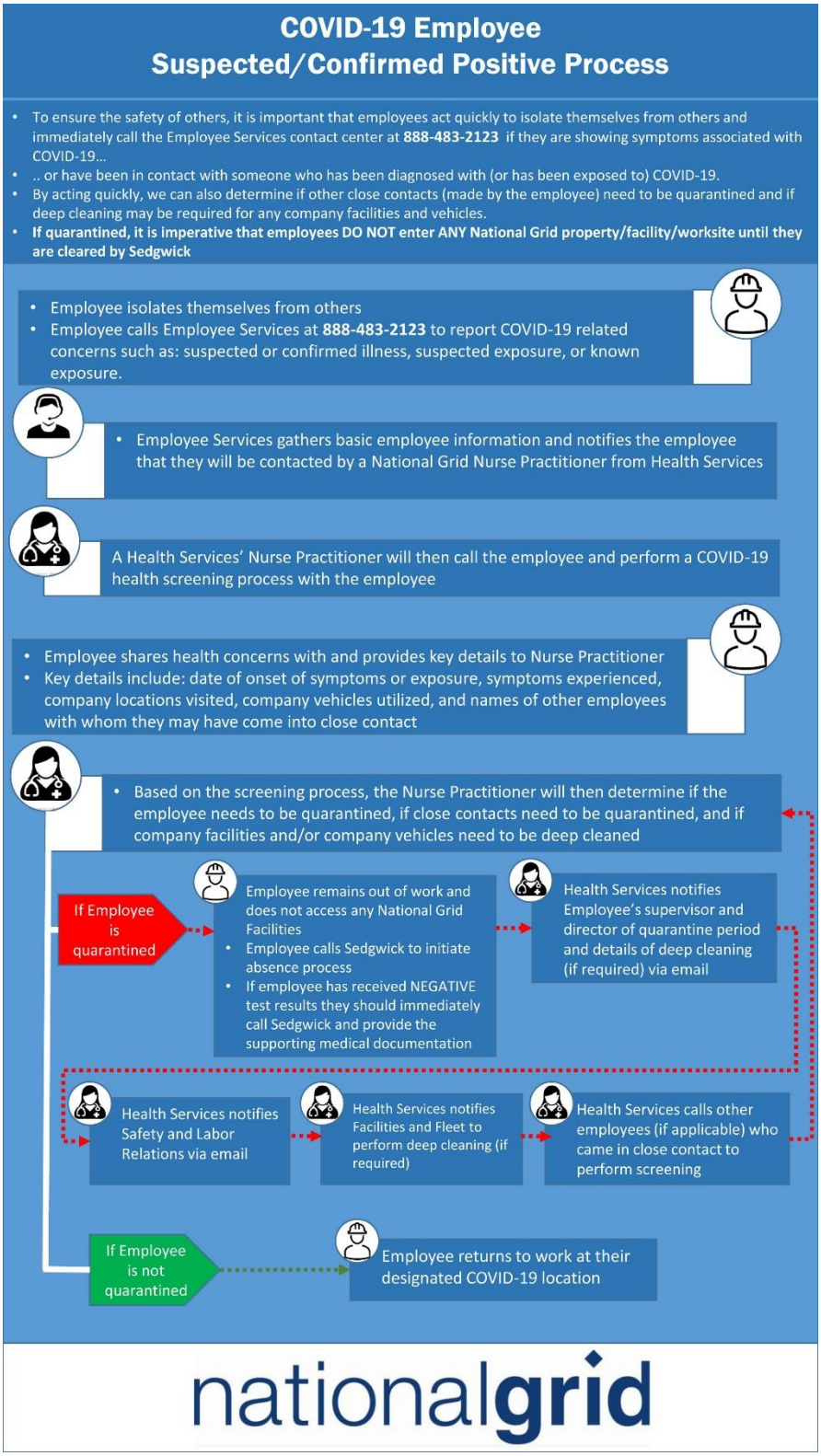
Employees who answer **"NO"** to all of these questions proceed with work activities as planned.

Please note on the Job Brief that you asked these COVID-19 Screening Questions.

To reduce multiple people handling the job brief during the COVID-19 pandemic crew leaders should handle all documentation and record who is present on site after they have reviewed the job brief with each employee or visitor.

REMINDER - Please be sure to follow CDC recommendations

- Maintain a minimum 6' social distance from other people
- Employees must wear a face covering: when working in public places, when working in a customers premise, or when social distancing is not able to be maintained with a co-worker, customer, or member of the public in a National Gird facility, barn/yard, work location, or company vehicle.
- Avoid touching your eyes, nose, and mouth.
- Clean and disinfect frequently touched objects and surfaces using either a EPA registered disinfectant (Lysol, Clorox, etc.), soap and water, or a bleach and water mixture (1/3rd cup bleach per gallon of water)
- Use the fold of your arm to cover a sneeze or cough
- Wash your hands often with soap and water for at least 20 seconds, especially after going to the bathroom; before eating; and after blowing your nose, coughing, or sneezing.
    - If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are visibly dirty.


COVID-19 Employee
Suspected/Confirmed Positive Process
To ensure the safety of others, it is important that employees act quickly to isolate themselves from others and immediately call the Employee Services contact center at 888-483-2123 if they are showing symptoms associated with COVID-19...
.. or have been in contact with someone who has been diagnosed with (or has been exposed to) COVID-19.
By acting quickly, we can also determine if other close contacts (made by the employee) need to be quarantined and if deep cleaning may be required for any company facilities and vehicles.
If quarantined, it is imperative that employees DO NOT enter ANY National Grid property/facility/worksite until they are cleared by Sedgwick
Employee isolates themselves from others
Employee calls Employee Services at 888-483-2123 to report COVID-19 related concerns such as: suspected or confirmed illness, suspected exposure, or known exposure.
Employee Services gathers basic employee information and notifies the employee that they will be contacted by a National Grid Nurse Practitioner from Health Services
A Health Services' Nurse Practitioner will then call the employee and perform a COVID-19 health screening process with the employee
Employee shares health concerns with and provides key details to Nurse Practitioner
Key details include: date of onset of symptoms or exposure, symptoms experienced, company locations visited, company vehicles utilized, and names of other employees with whom they may have come into close contact
Based on the screening process, the Nurse Practitioner will then determine if the employee needs to be quarantined, if close contacts need to be quarantined, and if company facilities and/or company vehicles need to be deep cleaned
If Employee is quarantined
Employee remains out of work and does not access any National Grid Facilities
Employee calls Sedgwick to initiate absence process
If employee has received NEGATIVE test results they should immediately call Sedgwick and provide the supporting medical documentation
Health Services notifies Employee's supervisor and director of quarantine period and details of deep cleaning (if required) via email
Health Services notifies Safety and Labor Relations via email
Health Services notifies Facilities and Fleet to perform deep cleaning (if required)
Health Services calls other employees (if applicable) who came in close contact to perform screening
If Employee is not quarantined
Employee returns to work at their designated COVID-19 location
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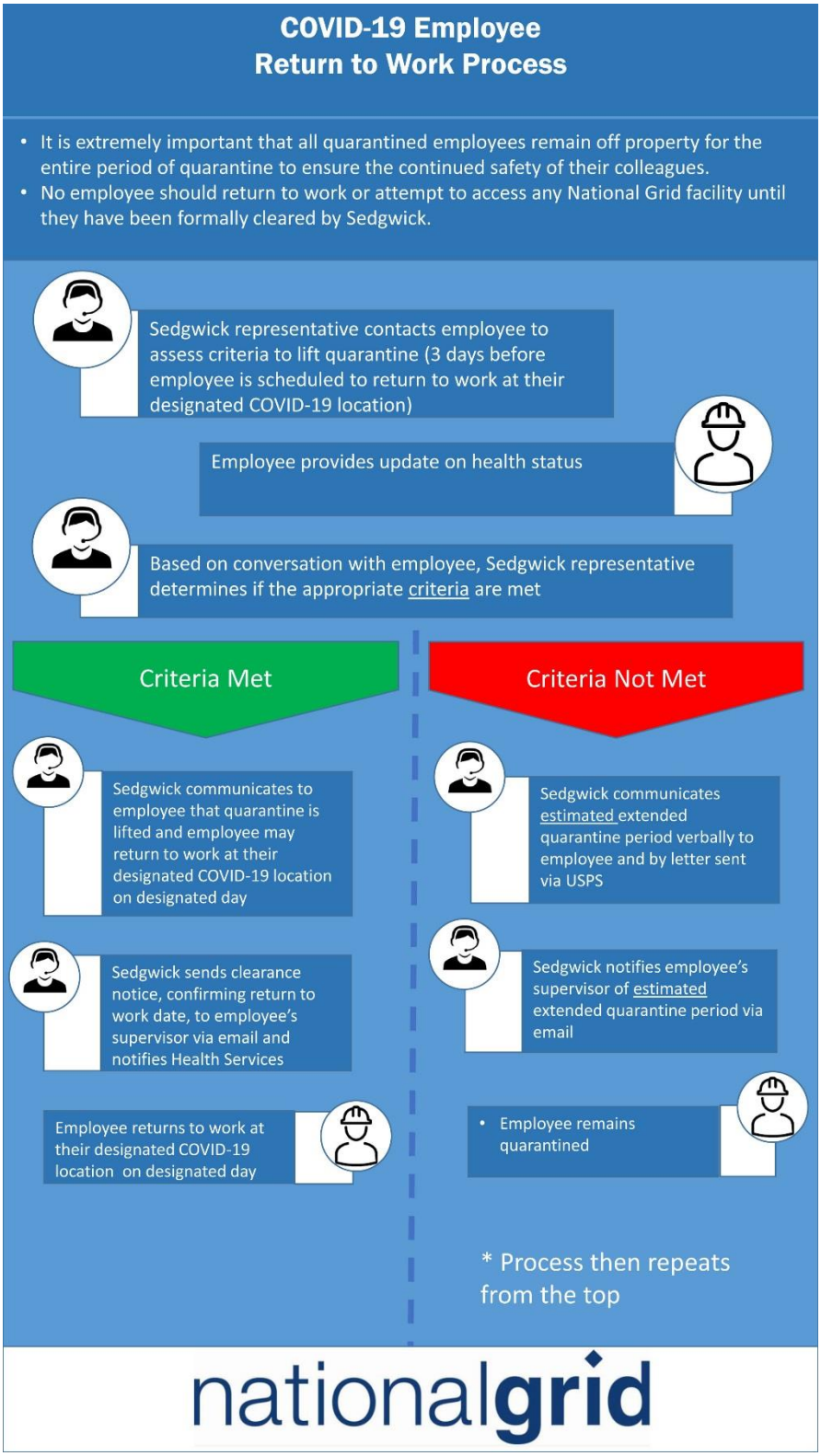
COVID-19 Employee
Return to Work Process
It is extremely important that all quarantined employees remain off property for the entire period of quarantine to ensure the continued safety of their colleagues.
No employee should return to work or attempt to access any National Grid facility until they have been formally cleared by Sedgwick.
Sedgwick representative contacts employee to assess criteria to lift quarantine (3 days before employee is scheduled to return to work at their designated COVID-19 location)
Employee provides update on health status
Based on conversation with employee, Sedgwick representative determines if the appropriate criteria are met
Criteria Met
Criteria Not Met
Sedgwick communicates to employee that quarantine is lifted and employee may return to work at their designated COVID-19 location on designated day
Sedgwick sends clearance notice, confirming return to work date, to employee's supervisor via email and notifies Health Services
Employee returns to work at their designated COVID-19 location on designated day
Sedgwick communicates estimated extended quarantine period verbally to employee and by letter sent via USPS
Sedgwick notifies employee's supervisor of estimated extended quarantine period via email
Employee remains quarantined
* Process then repeats from the top
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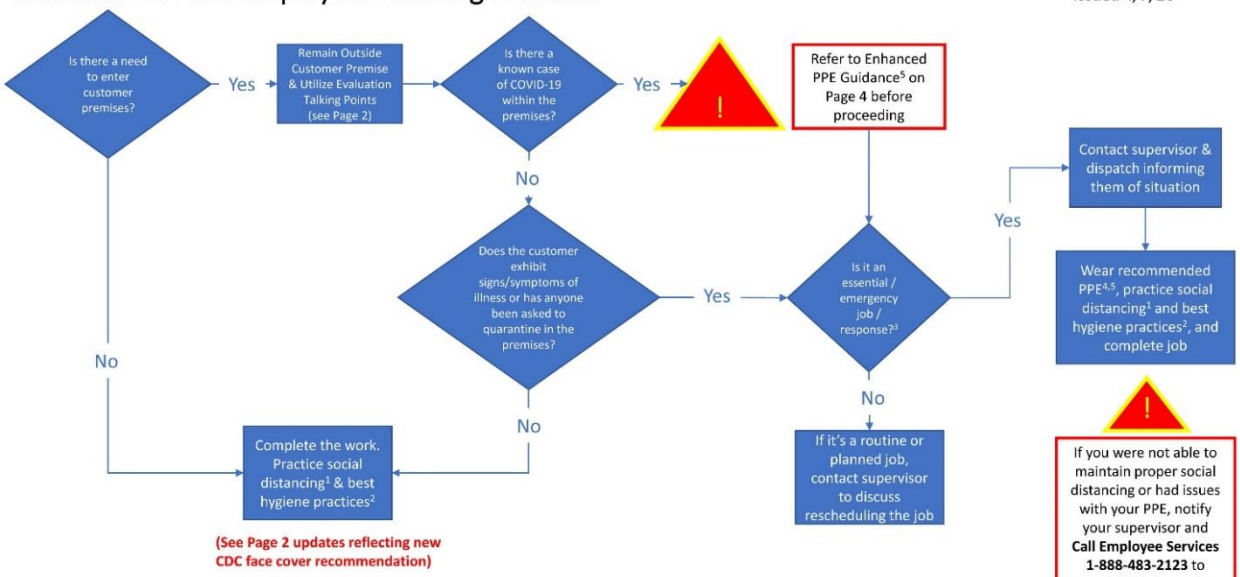
Guidance for Field Employees Entering Premises

Issued 4/7/20



See Page 2 for additional information on Talking Points, CDC Recommendations for (1) Social Distancing and (2) Best Hygiene Practices
See Page 3 for National Grid (3) Emergency Work at a Premises and (4) Standard PPE Guidance
See Page 4 for National Grid (5) Enhanced PPE Guidance

1

Issued 4/8/20

Talking Points - Engage Customer

Prior to entry, engage the customer and advise of social distancing practices. Here are some questions and statements.

- Does someone within the premises have a known case of COVID-19? Has someone within the premises tested positive for the COVID-19 virus?

(IF ANSWER IS 'YES' TO EITHER OF THE ABOVE QUESTIONS, REFER TO ENHANCED PPE GUIDANCE ON PAGE 4)

- Do you mind if I follow the social distancing practice today?
- Is anyone currently sick inside the premises?
- If you are feeling sick, would you mind remaining in another room while I am working This is a best practice policy my company is recommending. Can you tell me where your equipment is located?
- I will do my job, keep you updated and tell you when I am done

(1) Social Distancing

- Maintain at least 6 feet distance between yourself and the customer at all times
- Where social distancing measures cannot be maintained, face cover can be worn to help limit the spread of the virus (see National Grid's Face Cover Guidance for details)

(2) Best Hygiene Practices

- Face covering can be worn in public settings where social distancing measures cannot be maintained (see National Grid's Face Cover Guidance for details)
- Use alcohol-based hand sanitizer (at least 60% alcohol), before and after each home visit; OR wash hands using soap and water for 20 seconds

2

Issued 4/8/20

(3) Emergency Work at a Premises

On arrival, assess the premise/situation in its entirety and consider these questions.

- Is it a multi-unit building?
  - Is the unit where work is required affected?
- What work can be done without interaction/entry?
- Is entry through a side or back door possible to limit exposure?
- Can make safe actions be taken without interaction/entry?
  - Securing Outside Meter/Curb Valve
- Would a hardship be caused by isolating the service?

Note: These questions and considerations are meant to help guide in the decision making process. There may be instances where access to a premise cannot be avoided in order to address immediate public safety concerns. Please reference the Social Distancing and applicable PPE Guidance in all situations.

(4) Standard PPE Guidance for Entering a Premises (No Known COVID-19 cases are present)

- Avoid touching ANYTHING in customer premises other than company equipment and customer equipment related to the job
- Wear disposable latex or nitrile gloves to prevent touching contaminated surfaces
- Latex or nitrile gloves should be donned before entering the home
  - If work gloves are needed to perform the task, remove disposable latex or nitrile gloves and dispose of them. Don work gloves and perform task. Once task is complete remove work gloves and store them. Don a new pair of disposable latex or nitrile gloves to exit the home.
- Remove latex or nitrile gloves and dispose in way that won't create other opportunities for exposure
- Immediately wash / sanitize hands after removing latex or nitrile gloves
- All other PPE normally required for the work being performed should be used

3

Issued 4/8/20

(5) Enhanced PPE Guidance for Entering a Premise (Where a Known COVID-19 Case is Present)

The most effective way to protect the employees from contracting the virus is physical distance; if at all possible, the customer diagnosed with COVID-19 should be asked to move to a separate room before premises entry. When available and practicable, the following PPE items may be used at the premises with a known COVID-19 case present. These PPE items can be used in combination with our Social Distancing and Best Hygiene Practices to limit the spread of the virus.

- N-95 / KN-95 mask (see Page 5 for pictures of typical N-95 / KN-95 masks available)
- Reusable Face Shield
- Disposable Surgical Gloves (nitrile or latex)
- All other PPE required for doing the work (i.e. safety glasses, hard hat, etc.)
- If desired, FR-rated balaclava may be worn to provide additional protection while working

The following steps should be taken while conducting work in the premises:

- Prepare a paper or plastic bag for disposal of used PPE prior to entering the premises.
- Avoid touching ANYTHING in customer premises other than company equipment and customer equipment related to the job.
- Wear disposable latex or nitrile gloves to prevent touching contaminated surfaces.
- Any PPE should be donned before entering the home.
- If a mask is in use, avoid touching your face or adjusting the mask.
- If work gloves are needed to perform the task, remove disposable latex or nitrile gloves and dispose of them. Don work gloves and perform task. Once task is complete remove work gloves and store them. Don a new pair of disposable latex or nitrile gloves to exit the home.

Once work is completed in the home, follow these steps to safely remove the PPE items

- Remove face shield, taking care to avoid touching your face. Clean / disinfect and store properly.
- Remove mask from the back of the head first, taking care to avoid touching your face. Place used mask in a bag and dispose in normal trash.
- If balaclava has been worn, remove covering from back of head, similar to removal of mask.
- Remove latex or nitrile gloves (turn inside out while removing) and place in a bag. Dispose of bag in normal trash.
- Immediately wash / sanitize hands after removing latex or nitrile gloves, following Best Hygiene Practices.

4

Issued 4/8/20

Typical N-95 / KN-95 masks

5

Safeguarding your Vehicle

Now, more than ever, with COVID-19, precautions to safeguard your vehicle when transferring the vehicle to another employee, or when taking your vehicle in for maintenance, is very important.

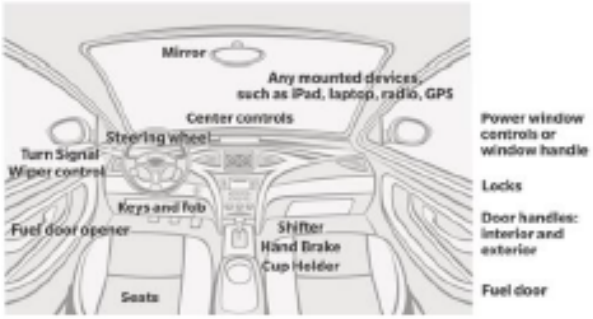
Here are some high-touch areas that should **never** be missed:

• Mirror • Center controls • Keys and fob • Wiper control • Climate control • Audio controls • Hand brake • Seats *(driver/passenger)*/Seatbelts • Fuel door opener • Windows • Headrests • Armrests	• All mounted devices *(any and all electronic devised used - i.e. iPad, laptop, radio, GPS, phone chargers)* • Steering wheel • Headlight switch • All cabin lighting controls • Shifter • Cup holder • Door handle*(inside and out)*/Window control/locks • Air vent • Sun visors

Use disinfectant wipes, diluted bleach solution, or damp soapy water wipes when cleaning all hard surfaces throughout the vehicle.

To guide your efforts when cleaning the vehicle, think about where droplets would fall when you sneeze or cough (*for example: do you turn your head to the side?) and remember to think about your own personal safety:*

- Be sure to wash your hands for **20 seconds** after completing the cleaning process.
- If you take your vehicle home at night, be sure to lock it to prevent it from being compromised.
- Make sure you have a mask and gloves (when/where appropriate).



Before you leave or enter the vehicle – here's a checklist to keep you safe and your team members safe as well:

Activity to Safeguard	☑
Keys / Fob	
Door Handles (interior/exterior)	
Steering Wheel, Shift Lever, Brake Lever, Wiper Stalk, Turn Signal Stalk	
Air Vents, Console, Dashboard, Cup Holder	
Exterior and Interior Fueling Latch, Cover, Cap	
Seats, Seatbelts, Headrests	
Mirrors, Windows, Window Controls	
Interior Lights	
Sun Visors	
Passenger and Driver Door Armrests, Grab Handles, Seat Adjusters	
All Electronic Devices used while in vehicle (iPads, Navigation Systems, Phone Chargers, Laptops, etc.)	

Additional considerations for crew trucks:

Handles on bin doors	
Equipment controls (bucket / digger)	

**** Please consider any other touch point identified by a crew member but not listed***

Contract Employees COVID-19 Reporting Process

Health Services does not typically manage the absences of our contract employees, "contractors". However, to protect our employees, we are screening sick/exposed contractors to determine if they have come into contact with National Grid employees, or if a facilities/vehicle deep cleaning is required. Contract employees are required to call Employee Services (ES) (888) 483-2123 directly. If the contractor does not call Employee Services, the National Grid supervisor may call ES to report the contractor out of work and to initiate contact tracing.

Contractors must be cleared to return to work (RTW) at National Grid by their employer. Per National Grid best practices, we are recommending a 14-day quarantine beginning on the date of notification for all contractors who are sick or believe they have been exposed to COVID-19.

Reporting Process:

1. Contractors call Employee Services **(888) 483-2123** for screening
2. Nurse Practitioner (NP) screens the contractor to determine National Grid close contacts, or if a National Grid facility or vehicle requires deep cleaning. NP obtains employer name and contact email from contractor
3. NP advises contractor to contact their doctor and their employer
4. An email will be sent to National Grid supervisor and the contractor's employer with quarantine start and end date (see email below)
5. Contractor must follow employer's RTW process and complete recommended quarantine (and be symptom free for 3 days)
6. NP will notify any National Grid close contacts to quarantine for 14 days and email National Grid supervisor(s)
7. After 14 days have elapsed, the contractor's employer must send an email to NP confirming that the contractor has returned to work, i.e., all RTW notifications and documentation must be forwarded to Mary Brown, NP Mary.Brown2@nationalgrid.com

Supervisor:

If you are calling Employee Services to report a contractor out of work so that we may initiate contact tracing, or a facilities deep cleaning, please be prepared to answer the following questions when speaking with the NP regarding your contractor:

- Contract employee name

- Contract Employer
- Contract Employer supervisor and email address
- Last date contractor was on National Grid worksite
- National Grid employees the contractor has been in close contact with
- Facilities/vehicle deep cleaning required

email sent to supervisor when contractor is taken out of work for quarantine:

RE: Quarantine Confidential

The contract employee "contractor" listed below has been quarantined and cannot report to a National Grid worksite until they have completed the recommended quarantine. This contractor will follow their employer's process for return to work. After the recommended quarantine has elapsed, and the contractor has been cleared to return to work by their employer, please send email to (Mary.Brown2@nationalgrid.com) to let us know the contractor is back on site.

Contract Employee Name:
Department/Contractor company:
National Grid Supervisor:
Quarantine start date:
End Date:

Appendix G

National Grid, Contractor Safety Requirements

FOREWORD

National Grid's vision is to be a world-class safety organization with zero injuries every day. This includes working to help ensure the safety of our employees, contractors and the community. National Grid is committed to delivering operational excellence, including excellent levels of safety internally and in cooperation with the external contractors we rely on.

The Executive Safety Committee provides review and input for Safety Policies and Procedures through the Safety Policies and Procedures Subcommittee.

The Safety department is the owner of this procedure and is responsible for maintaining and implementing this procedure, soliciting comments from stakeholders and revising as necessary.

This document, "Contractor Safety Requirements", represents the current contractor safety requirements that are unique to operations and various functional groups at National Grid. This document does not specifically reference actions that are required by OSHA, other laws, rules, or regulations. These are requirements that should be understood by the contractor and contractor compliance with all applicable federal, state and local laws, rules, and regulations is expected by National Grid as a contractual condition.

Questions regarding this procedure should be referred to the National Grid Safety Department.

This document will be updated as necessary to communicate all aspects of National Grid's contractor safety to bidders, current contractors and to reflect changes in National Grid's Safety Policies and Procedures.

Date of Review/Revision:

Revision	Date	Description
1	8/5/2004	Initial
2	3/2/2005	Additions
3	1/30/2007	Additions
4	8/1/2008	Additions
5	8/1/2010	Additions
6	2/1/2011	Audit recommendations included

Date of Review/Revision Continued:

Revision	Date	Description
7	9/11/2013	Additions included OH; technical changes; Compliance Monitoring; Ethics; Job Briefs
8	11/2/2015	Additions include Audit & IA recommendations; ISN alignment; technical changes, 1910. 269 updates
9	8/17/2016	Format update and technical changes
10	3/29/2017	Additions to sections 2.2.6 and 6.5
11	2/26/2018	Process Safety, PM&CC Electric and PM&CC Vegetation Additions
12	3/12/2019	Contaminated Site Work Additions
13	10/24/2019	Job brief, Hi-Vis clothing, ladder use, and air gap revisions
14	1/13/2020	Hi-Vis clothing and ladder use revisions; Fatigue Risk Addition in HASPs
15	3/10/2021	EH rated work boot and Dielectric (DI) footwear definitions and requirements; OSHA 1910.136(a) reference; requirement not to wear loose clothing; Hi-Vis vest or garment requirements
16	3/24/2021	One HASP form; HASP revisions; self-assessments; qualifications; and notice of subcontractors

17	6/14/2021	Loose garments/items for heavy equipment operators revision; addition of heavy equipment definition
18	5/4/2022	Removed requirements to upload contractor orientation/pre-construction meeting documents to ISN; Removed requirement to upload forestry training qualifications to ISN; Clarified that medium/high risk contractors acknowledge N1402 requirements by signing the N1402 acknowledgment form in ISN; Added additional examples to the medium/high risk exposure category; Revised the pre-construction meeting/contractor orientation requirement from “may” to “shall”; Changed Corporate Safety team references to Safety Policies & Programs

1.0 CONTRACTOR SAFETY AT NATIONAL GRID.....1

1.1 Definitions.....1

1.2 Introduction.....5

1.3 Risk Ranking of Work.....6

1.4 Bidder Information Request – High and Medium Risk Work.....6

1.5 Safety Compliance.....7

2.0 GENERAL SAFETY REQUIREMENTS.....9

2.1 Introduction.....9

2.2 Applicability.....9

3.0 ADMINISTRATIVE SAFETY REQUIREMENTS.....14

3.1 Worker Qualification Assurance.....14

3.2 Meetings.....16

3.3 Project Health & Safety Plan (HASP).....17

3.4 Contractor Orientation/Pre-Construction Meeting.....21

3.5 Job Safety Briefs.....23

3.6 Safety Meetings.....24

3.7 Incident Investigation.....24

4.0 TECHNICAL SAFETY REQUIREMENTS.....26

4.1 Personal Protective Equipment (PPE) Requirements – General.....26

4.2 Flame Resistant Clothing Requirements.....27

4.3 Rubber Gloves and Sleeves.....28

4.4 Isolation of Energized Apparatus.....29

4.5 Appointment of a Safety Observer.....31

4.6 Work Zone Traffic Control.....33

4.7 Qualified Gas Worker.....33

4.8 Qualified Electrical Worker.....34

4.9 Qualifying Non-Electrical Worker.....35

4.10 Asbestos, Lead and other Hazardous Materials.....35

4.11 Lift Plans for Work Near Energized Electrical Equipment.....36

4.12 Fall Protection.....36

4.13 Herbicide Application 37

5.0 UNDERGROUND OPERATIONS WORK 38

5.1 PPE Requirements 38

5.2 Enclosed Space Assessment, Ventilation, Entry and Rescue 38

5.3 Equipment Safety Inspection 38

6.0 OVERHEAD LINE WORK 39

6.1 PPE Requirements 39

6.2 Fall Protection 40

6.3 Pole/Structure Inspection 40

6.4 Electrical Work Methods 40

6.5 Transmission Overhead Lines 41

7.0 SUBSTATIONS 42

7.1 PPE Requirements 42

7.2 Notification of Control Authority When Entering a Substation 43

7.3 Substation Work Area Identification (SWAI) 43

8.0 GAS OPERATIONS WORK 44

8.1 PPE Requirements 44

8.2 Gas Operations 44

9.0 FORESTRY AND VEGETATION MANAGEMENT 45

9.1 PPE Requirements 45

9.2 Equipment and Work Methods 46

9.3 Training 46

10.0 LNG PRODUCTION, TRANSPORT AND HANDLING 47

10.1 PPE Requirements 47

10.2 Training 47

11.0 ELECTRIC GENERATION 47

11.1 PPE Requirements 48

11.2 Training 48

11.3 Equipment & Excavations 48

11.4 Equipment Isolation 49

12.0 CIVIL CONSTRUCTION 49

12.1 PPE Requirements 49
12.2 Enclosed Space Assessment and Ventilation 49
12.3 Equipment Safety Inspection 50
12.4 Excavation Requirements 50
12.5 Cable fault finding and replacements 51
12.6 Technical Review 51
13.0 CONSTRUCTION PROJECTS AT CONTAMINATED SITES 52
14.0 AVIATION 52
15.0 TRANSPORTATION RISKS 52
APPENDIX A: NATIONAL GRID CONTRACTOR RISK MATRIX 53

1.0 CONTRACTOR SAFETY AT NATIONAL GRID

1.1 Definitions

Adverse Public Impact
Incident that disrupts service to the public or results in adverse public reaction.

Bulk Commodity Transportation
Activities involved in the movement of bulk commodities via truck, rail, plane or water vessel onsite and offsite on behalf of National Grid that if released could have safety and / or environmental consequences. Examples include but are not limited to: gasoline, oil, boiler chemicals, LNG, Nitrogen.

Compliance Assessments (CAs)
An act of observing and engaging in discussion with employees at a job site or work area locations. Compliance Assessments are documented using the Compliance Assessment checklist for each segment of operation and are not considered anonymous. Compliance Assessments are utilized to comply with internal policy and external regulatory requirements.

Contracted Services
Contracted Services refers to any activity that is conducted by an organization or individual under the terms of a purchase order or through other financial arrangements (Procurement Card or credit card) between a National Grid representative and a contractor. Contracted services may include all types of construction and maintenance services, tree trimming, building maintenance and demolition, electrical structure dismantling, site restoration, engineering design, recycling and waste disposal, drilling, rigging, electrical, and utility pole/structure maintenance.

Contractor
An independent person or company that undertakes a contract to provide materials or labor to perform a service or do a job and are responsible for the safety of his/her employees and subcontractors.

Contractor Orientation
Contractor orientation is intended to serve as a resource in order to provide the contractor with the tools necessary to educate their employees and subcontractors. The session is not intended to train the contractor management, their employees or subcontractors. The extent and content of the orientation session shall be commensurate with the scope and type of the contractor's activities.

Dielectric (DI) Footwear
This term describes either boots or overshoes that are labeled in accordance with ASTM F1117, marked clearly and permanently with the name of the manufacturer or supplier, the size and AC voltage rating. The footwear shall meet dielectric strength testing prescribed in ASTM F1116. Dielectric footwear shall have a minimum rating of 15kV.

Effective Safety Discussion (ESD)
A discussion with an individual or group about their safety programs, issues or concerns (safety plans, tools, equipment, procedures, etc.). They are safety discussions amongst employees that share similar work environments…office to office, field to field.

EH Rated Work Boot
ASTM F2413 EH rated work boots are the minimum foot protection standard. This boot protects against impact, compression, and low voltage exposure.

Health & Safety Plan (HASP)
Contractors who perform high or medium risk-ranked services shall submit a project-specific HASP prior to the start of the project. In this plan, the contractor shall identify all significant tasks, their anticipated hazards and mitigation steps.

Hazardous Conditions
A condition that can and is rectified immediately by the person who identified the hazard.

Heavy Equipment
Maintenance and construction equipment including excavators, compact (mini) excavators, backhoe loaders, towable compact backhoes, front end loaders, skid-steer loaders, compact loaders, digger derricks, boom trucks, cranes and bulldozers.

Incident
An unplanned event that has a human component and results in or could potentially result in harm to people, damage to property and/or adverse public impact.

Incident Management System (IMS)
National Grid's online incident management tool that allows the company to report safety, environmental and asset-related incidents, perform incident analysis, generate safety reports and monitor the organization's safety performance.

ISNetworld, Inc. (ISN or ISN System)
Third party contractor that is a global resource for connecting Hiring Clients with safe and reliable contractors and is a contractor information management system currently contracted with National Grid.

Job Brief
A planned interactive discussion that covers, but is not limited to, potential hazards associated with the job including situational awareness (assets or other items which may impact the job at hand), work procedures involved, special precautions, and personal protective equipment requirements. The discussion should include all contractor employees, sub-contractors and team members working on a job that occurs just prior to a job, task or project. A new job brief shall be conducted for each of the following events: prior to a change in planned work specific to the job site, changes in weather conditions, extended breaks (i.e. lunch breaks) or when a new worker or company joins the crew. When possible and reasonably practical, a National Grid Representative should be present at contractor job briefings. Truck drivers for daily, non-hazardous material deliveries such as stone, gravel, concrete material or porta john cleaning are exempt from completing a job brief unless there are potential hazards associated to the driver or delivery. A National Grid representative shall talk to the driver to determine if a job brief is needed.

Major Hazard Asset (MHA)
A class of assets at National Grid, including Compressed Natural Gas (CNG), Gas Transmission (≥ 125 psig), Power Generation sites, Liquefied Natural Gas (LNG) plants, and LNG Trucking, in which any condition, or set of conditions, presents potential for a major accident to occur. Also referred to as process safety assets.

Major Accident
An event involving the release of potentially dangerous materials, the sudden and uncontrolled release of large amounts of energy (such as fires and explosions), or both. These can have catastrophic effects and can result in multiple injuries and fatalities, as well as substantial reputational, economic, property, and environmental damage

Operator Qualification (OQ)
As defined in the Code of Federal Regulations, Transportation, 49 Subpart 192.801 through 192.809 and/or DOT pipeline qualified for gas contractors doing work at National Grid. Additional state requirements pursuant to the state the contractor is working may be required.

Process Safety Management
Method of focusing and mitigating concerns of major hazards impacting safety, environmental damage and business losses. It is an organized effort to identify and analyze the significance of hazardous situations associated with a process or activity to aid management in making critical safety decisions

Project Representative
National Grid Owner's Representative or designee who is assigned to certain contracted projects and communicates regularly with the contractor during the course of the contracted service. This person also ensures the work is being performed in accordance with the contract, including the safety requirements.

Purchase Order (P.O.)
An agreement/contract between National Grid and a contractor to provide services and/or materials. The P.O. is set up by Procurement. The term "Contract" and "P.O." are similar and may be used interchangeably. A "Blanket P.O." is set up for contractors whose work is on-going. A "one-time P.O." is set up for project work.

Qualified Electrical Worker
Those who are knowledgeable in the construction and operation of the electric power generation, transmission and/or distribution equipment involved, along with the associated hazards.

Qualified Gas Worker
Any contractor who performs covered tasks in accordance with National Grid's Operator Qualification Program and the Northeast Gas Association are required to be knowledgeable and meet all regulatory standards.

Risk Assessment
A risk assessment is the process of identifying hazards and calculating or ranking the associated risks according to: the likelihood of occurrence, the severity of the harm from the hazard, and the amount of time of exposure to the hazard.

Safety Observer
A person who is responsible for alerting the work team to any potential unsafe conditions or lack of compliance with approved work practices, procedures or guidelines.

Transportation Advisor
Third party agency specializing in federal and company mandated drug and alcohol testing programs.

1.2 Introduction

Safety performance is a prime consideration in the selection of contractors. National Grid will stipulate safety performance requirements and responsibilities in our contracts, purchase orders (POs) and will hold the contractor accountable for meeting the contractual requirements.

National Grid's goal is to establish a long-term working relationship with contractors who share the same safety values and demonstrate those values through their work performance.

Contractor safety at National Grid involves three broad areas:

1. **The Contractor Procurement (Selection) Process**
   Contractor safety begins with the selection of contractors who have demonstrated a strong safety record. National Grid will complete a review during the procurement process that involves determining a contractors' risk and the scope(s) of work involved. National Grid currently uses ISNetworld, Inc. as a third (3rd) party assessment process for assisting with contractor procurement. The 3rd party entity will vet and continually monitor individual contractors' compliance with applicable safety and/or risk and insurance program requirements.

2. **Safety Communication**
   Safety communication covers all the avenues and forums in which National Grid and the contractor communicates safety. Communication begins early in the bidding phase and is on-going as an integral part of the contractor-customer relationship. The goal is to ensure clarity, transparency and to limit misunderstandings.

3. **Safety Compliance**
   Safety compliance is the process of ensuring that the necessary technical provisions of the contract are being followed. National Grid will assign a project representative or other designee to provide guidance and oversight. The Contractor is responsible for their employees and subcontractors and shall be held accountable for ensuring compliance with all applicable safety rules while working on National Grid property, rights of way (ROWs) and our assets. Primary contractors are required to notify National Grid of any subcontractors and ensure that there is an appropriate contractual relationship in place in line with the terms and conditions of their contract.

1.3 Risk Ranking of Work

1. National Grid characterizes and ranks risk by the scopes of work performed. The categories are classified as high, medium or low risk. Prior to being considered for work at National Grid, contractors who perform High or Medium Risk work must be pre-qualified in ISN. See Appendix A for more information regarding the National Grid Contractor Risk Matrix.

2. Activities that are designated as “high risk” means that catastrophic event can result if safety measures are not followed. Activities designated as “medium” risk present certain opportunities for moderate to significant injuries, property or reputational damage, and/or loss of service and/or possibly business continuity. Activities designated as “low” risk may still require safety compliance and control measures, although the contractor performing the work does not necessarily need to be enrolled in ISN, if that is the only classification of work that contractor performs for National Grid.

3. The designation High Risk, Medium Risk, or Low Risk, refers only to the inherent risk associated with the work activity and is not an opinion on the ability of a contractor to work safely.

4. If ,at any time, the risk changes from low to medium/high, per the risk matrix, then the medium/high risk process shall be followed. It’s the contractor’s responsibility to identify if the risk changed and to escalate to National Grid personnel.

5. The Procurement Agent will notify the bidder/contractor at the beginning of the procurement process if their contracted service has been ranked as high or medium risk.

1.4 Bidder Information Request – High and Medium Risk Work

1. Any contractor bidding on high or medium risk work shall be required to complete a questionnaire regarding the Contractor’s safety program, compliance and history of occupational illnesses and injuries (ISNetworld New Vendor Onboarding application form, located on the ISNetworld website). Contractors will also be required to demonstrate in ISN that all employees, including subcontractors, are qualified to perform the scope of services.

2. ISNetworld then thoroughly reviews contractors’ qualifications against a prerequisite list of National Grid criteria. National Grid has established that contractors performing high or medium risk work MUST HAVE and MAINTAIN a grade of “C” or better in the ISN system to perform work and services for National Grid. ISN will track and manage the National Grid pre-

qualified contractor bidder lists. This bidder list is the first step for a contractor in establishing a working relationship with National Grid. For active ISN contractors, ISN will request updated information monthly. Contractors who do not have a current PO, contract, or authorized scope of work with National Grid will be considered as a Prospective bidder and will be asked to submit information quarterly. It is understood that insurance may not be maintained within National Grid standards, however, once a contractor is awarded a contract, proper and adequate insurance must be provided to ISNetworld to achieve a passing grade. Lack of insurance or inadequate insurance is an immediate "F" grade in the ISN system per National Grid criteria.

3. Project representatives may request an exemption or variance from requiring a contractor to be placed in ISNetworld for various reasons. A Supplier Exemption Request form (located in the safety policies and procedures section of Grid:home) shall be completed, documented and signed by the business unit VP and Safety Policies & Programs Director prior to contract award.

4. The information that the Bidder provides National Grid via ISN serves as the basis for assessing safety qualification. For this reason, it is important for contractors to maintain transparency throughout the process. National Grid and ISN will review all submitted information. Any effort in avoiding complete disclosure will disqualify the Bidder from bidding work at National Grid.

1.5 Safety Compliance

1. Medium/high risk contractors certify that they have been informed of National Grid safety requirements, that employees and subcontractors have the appropriate qualifications to perform the work, and agree to comply with all applicable safety requirements. This will be accomplished by the contractor signing the N-1402 Contractor Safety Requirements Acknowledgment Form in ISN annually and when there are revisions to N-1402.

2. National Grid representatives evaluate contractor compliance by conducting routine site visits, Compliance Assessments (CA's), Effective Safety Discussion (ESD) visits and attending periodic contractor safety meetings. Contractors should also perform and document safety self-assessments to ensure compliance to federal, state, local and National Grid regulations. This combined effort enhances, solidifies safety compliance and has the added benefit of quality control / quality assurance of the work performed.

3. Contractors bidding on new work shall provide worker qualifications to the National Grid procurement representative via the “Bidder Information Request” form and/or ISN National Grid On-boarding form.

4. If a safety violation is observed by a National Grid representative, the violation will be discussed with the contractor at the time of discovery.

5. Contractor employees enrolled in ISNetworld that are involved in any accident, incident or significant near-miss event, will be required to lead an investigation and root cause determination process. In addition, the contractor must implement corrective actions and establish measures to prevent a recurrence through an incident investigation process and document the details within ISN.

6. Individual contractor personnel who habitually violate any safety rules should be identified, and the contractor should remove the individual(s) from the project. National Grid reserves the right to remove any contractor employee(s) who violate safety rules or procedures; pose a safety risk to themselves, other contractors; our employees; or the general public.

7. If a contractor is observed to be operating in a manner that creates an imminent danger to persons or property, it is the responsibility of all individuals observing the hazard to cease the hazardous operation impacted until the issue has been resolved to the satisfaction of National Grid, the Owners Representative or Safety Representative.

8. Contracts/POs shall require the contractor to immediately forward any citations, notices, or OSHA reportable cases per 29 CFR 1904.39 from a National Grid project, upon receipt to the appropriate project representative and/or ISN. The project representative shall distribute copies of the citation or notice to senior management, Safety, Procurement, and the Legal Department.

9. Willful and/or repeat violations of safety requirements by the contractor may be considered a breach of the contract and reason for contract termination.

10. If the contractor’s overall safety performance is viewed as being unsatisfactory or noncompliant with contract provisions, and if the contractor is unwilling to demonstrate satisfactory program improvement, the result may be considered a breach of the contract and reason for contract termination.

11. National Grid project managers and/or construction supervisors shall document safety compliance by completing a “Contractor Performance Evaluation” for each project. This documents both positive and negative

safety performance or behaviors and this feedback will be used in the decision process for awarding future contracts.

2.0 GENERAL SAFETY REQUIREMENTS

2.1 Introduction

1. All contractors are required, and expected to comply with all applicable requirements of the Occupational Safety and Health Administration (OSHA), and all other applicable federal, state and local laws, ordinances, regulations, and other project and site-specific permits unless superseded by identified National Grid procedures.

2. This document represents policies and safety-related work methods unique to National Grid and they may be more stringent than OSHA regulations. Contractors must follow these requirements as well as their own rules or regulations that meet or exceed OSHA and other regulatory requirements.

3. National Grid will provide more detailed information and guidance regarding specific procedures prior to commencement of work.

4. Per OSHA 1910.136(a) general requirements, the employer shall ensure that each affected employee uses protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, or when the use of protective footwear will protect the affected employee from an electrical hazard, such as a static-discharge or electric-shock hazard, that remains after the employer takes other necessary protective measures.

2.2 Applicability

Applies to: All contractors, as needed

1. In any contracted task, where a safety observer is required, it is the responsibility of the contractor to provide that person and ensure that he/she is qualified to perform the role when needed.

2. A 4:1 pitch shall be maintained when using an extension ladder or the ladder shall be tied off and/or secured and 3 points of contact shall be maintained by the climber. If both hands are needed to perform work, then fall protection is required.

3. Although not preferred, if hard hats are worn backwards, the suspension adjuster must always face the rear. Class E hard hats are required for all electrical work.

4. ASTM F1117 Dielectric (DI) footwear is required when:
    - Workers on the ground are working within 50’ of the master ground connection point to earth.
    - Operating a wire trailer and pulling/tensioning machine.
    - Operating a winch truck or reel trailer with its payout in an energized area that may result in inadvertent contact.
    - Hand digging in close proximity to energized cables within the tolerance zone.
    - Making repairs in a trench to a faulted primary cable without de-energizing any adjacent energized primary cables within close proximity.
    - Using approved live line tools to move energized primary cables in a trench.
    - If removing underground cable rubber covering or arc suppression blankets from an energized cable.
    - Working within minimum approach distance (MAD) of downed electrical wires or foot patrolling for such wires.
    - If setting poles in proximity to energized lines or equipment and using truck controls from the ground.

5. National Grid expects that all cargo will be secured in accordance with U.S. DOT requirements.

    - As of January 2004, the Federal Motor Carrier Safety Administration (FMCSA) within the U.S. DOT published Cargo Securement Rules 393.100-136 Subpart I – Protection Against Shifting and Falling Cargo.

6. Chaps are required to be worn by ANY person using a chainsaw to make a cut on the ground or assisting in that cut and within striking distance. Other situations where cut off machines are used, chaps designed for the purpose of providing durable protection from abrasion, spatter and sparks from cutting ferrous metals shall be required; however, a hazard assessment should be completed to determine the need. Always use proper cutting techniques and push blades away from the body when using tools that may slip or inadvertently make contact with the leg. Never leave any equipment running while not in use.

7. All applicable contractors must meet the requirements of drug and alcohol testing in accordance with FMCSA DOT 49 CFR Part 40 and Pipeline and

Hazardous Materials Safety Administration (PHMSA) DOT 49 CFR Part 199. National Grid shall monitor contractor compliance to the drug and alcohol regulatory requirements through Transportation Advisor or ISNetworld as needed.

8. Contractors who drive regularly in delivery of service for National Grid shall:

   a. Have a safe motor vehicle operations policy which must be communicated to their employees before they begin driving for company business. The contractor is expected to follow National Grid's *Safe Motor Vehicle Operations* policy to include the following:
      - Prior to moving any vehicle, the driver shall perform a "circle of safety" inspection. This is to confirm not any person, animal, equipment, or property will be injured or damaged when the vehicle is moved.
      - Drivers should back into or pull through a parking space so that when you re-enter the vehicle, the first move is forward.
      - No driver shall use a hand-held mobile telephone while driving a vehicle for National Grid business.
      - The driver shall eliminate or minimize sources of potential driving distractions to include, eating, smoking, reading, writing, grooming, use of any electronic devices, mirror or seat adjustment. These shall be done when the vehicle is not in motion.

   b. Comply with all requirements of all federal, state and local regulations regarding safe motor vehicle operations.

   c. Ensure that new and existing employees have a valid Driver's License in accordance with requirements of specific job duties and classification/type of the vehicle they are operating. Contractors must have an acceptable driving record. If their driving record is unacceptable, the driver shall not be permitted to operate a vehicle on behalf of National Grid.

   d. Provide vehicles in safe operating condition, in accordance with federal state and local regulations. The vehicle should be equipped with proper safety equipment as appropriate for the vehicle type and its intended use.

e. Track and evaluate any vehicular accidents or incidents experienced by their employees. Corrective actions, such as driver coaching, corrective action driver training and medical/vision tests should be recommended and acted upon where appropriate. All accidents or near misses while performing work for National Grid shall be communicated to the National Grid project representative or designee and documented in the ISN system.

f. For more information, contact a National Grid representative for a copy of the National Grid Safety Policy *Safe Motor Vehicle Operations*

9. All contractors that require the use of heavy equipment shall ensure that competent, appropriately licensed, skilled and qualified personnel are in control of this equipment at all times. In addition, contractors shall ensure the following:

- Equipment is inspected for safety and use at the beginning of the work period of shift. All failing or defective equipment and components shall be removed from service.
- Equipment is under the control of trained operators who are always aware of their location and the locations/presence of persons working near the equipment, its swing zones and blind spots.
- While operating heavy equipment, operators shall ensure that loose fitting vests, jackets or other garments/items shall not be worn that could inadvertently get caught on equipment controls. Upon exiting the heavy equipment, the operator shall immediately put on their hi-vis vest/garment.
- Equipment is kept free of debris, water, oil, grease, mud or anything that could create a slip/fall hazard inside the cab.
- Keep hands, feet, and clothing away from power-driven and moving parts.
- Equipment cab windows should be kept clean and free of mud, ice, snow and/or fog for maximum visibility.
- Never carry passengers on heavy equipment or any equipment unless it is equipped to do so.
- Ensure that stabilizers are extended prior to starting a task.

- Before making a swing, operators shall always look out the windows and mirrors for confirmation that the area is clear. If visual confirmation is impaired or the operator is unsure due to weather, lighting or other interferences, the operator shall cease operation until an independent spotter can check the swing area and confirm it is clear.

- All excavations shall have signs posted, demarcation and controlled to prevent unauthorized persons from entering and falling inadvertently into the excavation. Excavations shall only be opened under the supervision of a competent person for excavation.

- All pot holing/test holing and exploratory excavations shall utilize vacuum excavation whenever near known or the possibility of unknown hazards such as live electrical or gas conveyances. When using vacuum excavation in combination with air blowing/air knife tools, all persons in the immediate area shall be wearing safety glasses in addition to a full face shield.

- No one is to work under a suspended load.

- Never use a bucket to lift personnel.

- Ensure stabilizers are in the upright and stored position before moving equipment.

- Operators shall not leave heavy equipment running unless the following requirements are met:

    - Parking break is engaged and wheels are chocked (if applicable)

    - Surroundings create no hazard of unqualified personnel entering unattended equipment

    - Vehicles and equipment idling limited to that designated state and local environmental regulations (generally, 3 to 5 minutes maximum). See table below for additional information

Region	Vehicles	Idling Limit	Exemptions Include
New York	Diesel trucks	5 minutes	• Traffic conditions • Temperatures < 25°F and motionless for two hrs • Hybrid electric engine charging battery vehicles • To provide power to auxiliary sources
NYC	All Motor vehicles	3 minutes	• Emergency vehicles • Loading/unloading • Temperatures <40°F
New Hampshire	Diesel/ Gas vehicles	5 minutes >32°F 15 minutes -10°F to 32°F No Limit <-10°F and no nuisance created	• Traffic conditions • Emergency vehicles takeoff power for auxiliary uses • Vehicles being serviced or repaired • Operated solely to defrost windshield
Massachusetts	All Motor Vehicles	5 minutes	• Vehicles being serviced or repaired • Vehicles in operation for which associated power is needed • Delivery vehicle in which engine power is needed
Rhode Island	Diesel Motor Vehicles	5 minutes	• Traffic conditions • Operate defrosting, heating, or cooling equipment to ensure health and safety of the driver or passenger. • Temperatures between 0 & 32°F - 15 minutes per hour. If < 0°F idling as needed for heat • To provide power to auxiliary sources • Vehicles being serviced or repaired
Vermont	All Motor Vehicles	5 minutes within any 60-minute period	• Emergency/public safety vehicles while engaged in "official operations" • Idling necessary to operate safety equipment • Vehicles in operation for which associated power is needed • Vehicles being serviced or repaired

- All lifts that occur on National Grid properties, ROWs or near critical assets require formal lifting plans developed by the contractor and reviewed with the National Grid project representative. Some lifts will also require formal critical lifting plans and this may include PE or geotechnical assessments to ensure a stable lifting base for the crane or other apparatus.

10. All temporary, metal fencing installed or located under transmission lines shall be grounded and have signage according to National Grid grounding standards. Contact a National Grid representative for a copy of the Engineering Documents ST 03.05.001ST 03.06.001 and SP 08.00.001.

3.0 ADMINISTRATIVE SAFETY REQUIREMENTS

3.1 Worker Qualification Assurance

1. In order to meet National Grid safety requirements, the contractor must describe how workers, including subcontractors, are qualified. The contractor must supply information concerning the type of skills assessment performed, training programs and how they ensure that employees

demonstrate competencies. National Grid reserves the right to review this information and request additional training requirements. All documents shall be uploaded and maintained in the ISN system for high/medium contractors. For work on process safety assets, the contractor shall ensure all workers and sub-contractors are trained and receive appropriate refresher training to maintain their appropriate level of certification and qualifications needed to perform work safely.

2. For low-risk contractors who perform activities that require PPE, which excludes office-based contractors and/or consultants, or other non-physical low-risk contractors, the contractor is required to watch an on-boarding video annually prior to any jobs starting for that year. The contractor employees and subcontractors are required to watch the video to be clear on safety expectations. Contractor to ensure that any new employees performing services for National Grid watch the on-boarding video if they hadn't watched it in the annual release. A link to the video can be obtained from the Project Representative.

3. Medium/high risk contractors shall complete an annual in-person on-boarding hosted by National Grid supervisor or project manager. The on-boarding shall emphasize required qualifications, HASP requirements, and requirements on revisions to HASPs when changes to the scope of work on the site or changes to risk occur. The National Grid supervisor or project manager are to conduct the on-boarding and determine the appropriate material to be used to communicate and emphasize the expectations.

4. Contractors shall conduct their own safety self-assessments.

Periodic field visits and/or verbal contact shall be conducted by the National Grid supervisor or project manager who are familiar with the work and existing scope. The National Grid supervisor or project manager shall review the work performed during the field checks and/or verbal contact and can ask the contractor to provide qualifications upon request.

During the field visits/verbal contacts, National Grid supervisor or project manager shall also review existing HASPs and/or job briefs as applicable for current work scope and require any revisions based on observations. The field checks/contacts are to be documented using Compliance Assessments, Contractor Evaluations, or ESDs.

If HASP or job brief does not cover observed hazards and risk mitigation, work shall be stopped until a revised HASP or job brief and approval of the revision occurs, which is required before work can continue.

The frequency of the field visits/verbal contacts are based on risk perception of the job, including variability of conditions, and if there is greater chance of serious injury or fatality based on high-energy presence (gravity, pressure, energy). Higher volume of visits should be conducted if it's a new contractor, based on contractor's performance (review IMS, Compliance Assessments, etc.), or if variations exist including: change in project scope, weather, change in crew and/or subcontractors, change in equipment on site, new high energy factors are present (greater chance of SIF), and long duration job.

5. The contractor shall provide management personnel qualifications through resumes or other documents. National Grid may interview and/or approve management personnel if considered necessary.

6. For work on Process Safety assets (Gas Transmission, Generation, LNG, LNG Transportation and CNG), contractors shall provide a description of their experience in the business asset and specific tasks including similar projects, lists of licenses/certifications, and references from previous similar projects. Contractors shall be made knowledgeable of National Grid process safety requirements that are relevant to their specific work activities by the business hiring them.

3.2 Meetings

Applies to: All contractors; as needed

1. The pre-bid meeting is coordinated by National Grid Procurement to provide bidders with an opportunity to become acquainted with contractual requirements and specific safety issues concerning the project, including company-specific safety rules and known site conditions.
   a. For contractors working on Major Hazard Assets, contractual language including designation of site medical facilities, locker rooms, bathrooms, etc. should be discussed by the project team with the contractor at this time.

2. At this time, Procurement will notify the prospective bidders of the following:

   a. If they are required to submit a project safety plan (HASP) prior to the pre-construction meeting

b. The cost of specific safety equipment, practices and personal protective equipment shall be factored into their bid/proposal.

3.3 Project Health & Safety Plan (HASP)

Applies to: Contractors performing high or medium risk work

All HASPs shall be submitted to the National Grid project owner for review and approval before work commences. The National Grid project owner shall ensure the HASP meets National Grid criteria and includes all aspects of the project prior to a review by Field Safety (if applicable). The project owner shall review the HASP. Field Safety shall also review the HASP after the business conducts its review only if the work is unique, there's a new project manager or supervisor, the work involves PHAs, or there's unfamiliarity with the project or safety standards.

If changes are required, a new HASP shall be created and rereviewed.

If the scope of work on the job site changes from the approved HASP, work shall be stopped. The HASP shall be revised and rereviewed by National Grid Business (Field Safety review as applicable), and work can continue once the revised HASP has been reviewed for risk controls of changed scope. Until the HASP is updated work shall remain stopped. Failure to update the HASP will be considered a violation of safety requirements in line with section 1.5. It's the contractor's responsibility to inform National Grid personnel if the scope changes.

1. Contractors who perform high or medium risk-ranked services shall submit a project-specific HASP plan prior to the start of the project and/or at pre-construction meeting. The HASP is to be followed by the contractor's employees and its subcontractors.
2. At a minimum, the HASP shall include the following elements:
   a. Roles and Responsibilities
   b. Scope of Work
   c. For contractors working on Major Hazard Assets - List of all equipment contractor is expected to use in work activities and indication that it meets regulatory and National Grid requirements
   d. For contractors working on Major Hazard Assets - List of contractor materials to be brought onto work site for review and approval by National Grid

e. Task and hazard identification and risk assessment of the hazards

f. Hazard mitigation/control procedures and work methods

g. Incident investigation and reporting

h. Compliance and monitoring

For an example of a HASP, a National Grid representative can provide related policies and procedures under the *Contractor Safety* website in Grid:home.

3. The following requirements shall be included in the HASP for all work at contaminated sites. The HASP shall be site-specific and meet the requirements of 29 CFR 1910.120(b)(4)(ii). The HASP must include at a minimum:

a. A safety and health risk or hazard analysis for each site task and operation

b. Personal Protective Equipment to be used by employees for each of the site tasks and operations

c. Medical surveillance requirements

d. Frequency and types of air monitoring and personnel monitoring to be used

e. Site control measures

f. Decontamination procedures

g. An emergency response plan for safe and effective responses to emergencies, including the necessary PPE and other equipment

The contractor/National Grid project representative shall contact the Environmental Department for guidance on site requirements and to initiate any required regulatory notifications.

For contractors performing bulk commodity transportation activities, a risk assessment including the potential consequences, frequency and safeguards to be used shall be performed and included in the HASP. If a preexisting National Grid requirement is in place for managing bulk commodity transportation activities, one shall follow those requirements, with no additional risk assessment being required.

Every contracted and subcontracted employee, including those working alone, performing work on the project shall review the HASP to ensure steps in the plan are adhered to in order to mitigate hazards during the pre-job orientation. These mitigation steps shall be incorporated into all work plans and job briefs.

Truck drivers for daily, non-hazardous material deliveries such as stone, gravel, concrete material or porta john cleaning are exempt from completing a job brief unless there are potential hazards associated to the driver or delivery. A National Grid representative shall talk to the driver to determine if a job brief is needed.

In addition, all workers shall sign an attendance sheet during the pre-job orientation that they have reviewed the plan, will adhere to the mitigation steps and they fully understand the plan. This document will be kept at the job site and available for review as needed and if requested by any National Grid representative, or any other parties.

A. Roles and Responsibilities

The HASP shall identify who is providing project oversight and how they are qualified. For example, if the work requires excavation, there must be someone on-site who is qualified as an excavation competent person.

For multi-employer work-sites, the general contractor is responsible for all their employees and subcontractors. The safety plan shall clearly state this responsibility.

If requested to do so, Contractors shall designate a competent person to participate in or conduct a process hazard analysis (PHA) regarding a portion or the entirety of the project. National Grid will not be responsible for training the contractor on the PHA methodology.

B. Scope of Work

The Contractor shall clearly and briefly state the scope of work as provided by National Grid. The plan must specifically address the project or services requested by National Grid.

C. Task and Hazard Identification and Risk Assessment

The contractor shall perform a risk assessment by identifying all significant tasks, the anticipated hazards and hazard mitigation procedures.

If, at any time, the risk level changes on the job site, the contractor is to stop work until a revised HASP or job brief is created and discussed on site and reviewed by National Grid personnel.

Contractors performing work where their employees are exposed to fatigue, shall assess fatigue risk in their HASPs and identify the mitigations they will take to manage the risk to their employees.

The contractor's cost to provide adequate safety measures and to comply with National Grid requirements must be considered and budgeted in the bid/proposal.

D. Hazard Mitigation Procedures and Work Methods

For each hazard, the contractor shall specify measures that will be taken to eliminate, control or mitigate these hazards.

A table below is an example of a method to simply and clearly organize and present the task, hazard, and mitigation steps:

Location: Substation Yard		
Task	**Hazard**	**Mitigation Steps**
Material Handling	Contact with overhead energized lines/equipment	Off load in the clear and have a safety observer present

E. Incident Investigation and Reporting

All work related incidents involving injury or illness to employees, the public or property damage (including contractor vehicle accidents) shall be reported to the National Grid project representative and documented in the ISN system.

F. Compliance Monitoring

To ensure that both contractor employees and subcontractors will achieve safety compliance, jobs with over 100 workers at any point in time or in excess of $1 million will require a full time safety professional hired by the contractor. This safety professional must be qualified, competent and be on site anytime work is performed. Qualifications of this safety representative must be acceptable to National Grid prior to hire by the contractor and may be documented in the ISN system.

For other jobs that don't meet the above criteria, contractors shall monitor jobs in line with their safety management system.

G. Environmental Compliance

Unless otherwise specified and based on the scope of work, any potential environmental risks shall be determined and addressed by the contractor following all applicable National Grid procedures. For more information, contact a National Grid representative regarding Environmental Procedure No.6 *Contracted Services* and Environmental Procedure No.25 Appendix A, *Environmental Screening Checklist.*

3.4 Contractor Orientation/Pre-Construction Meeting

Applies to: All contractors, as needed

1. A National Grid project representative, construction supervisor, or other designated National Grid representative that hires the contractor shall hold a contractor orientation and/or pre-construction meeting prior to the contractor working for National Grid. Other attendees may include: the Safety department, Environmental representatives, as well as contractor management as needed.

2. It is intended to serve as a method to provide the contractor with the tools necessary to educate their employees and subcontractors on National Grid's procedures and requirements. The session is not intended to train the contractor management, their employees or subcontractors.

3. All contractors are required to attend a National Grid orientation program specific to the type of work they will be performing. Contractor management representation shall also be present meeting and all documentation of attendance shall be kept at the job site and available to any National Grid representative. For visitors and contractors working on Major Hazard Assets, site orientation shall at a minimum include the following:

   - General site hazards
   - Specific hazards involved in each task the employee may perform
   - Safety policies and work rules, including Process Safety policies
   - Location of emergency equipment like fire extinguishers, eyewash stations, and first-aid supplies
   - Smoking regulations and designated smoking areas if applicable
   - Steps to take following an accident or injury

- Proper reporting of emergencies, accidents, and near misses
- Selection, use, and care of personal protective equipment
- Emergency evacuation procedures, routes, and security systems
- Safe housekeeping rules
- Safe use of tools and equipment
- Hazardous materials in use and location of safety data sheets

Site access shall not be granted to contract employees working on process safety assets until orientation is conducted.

4. The contractor's Project Health & Safety Plan will be discussed at this meeting including a final review of the safety hazards checklist to ensure proper hazard identification and mitigation plan has been implemented.

5. These hazard mitigation measures shall be reviewed and work shall not commence until these hazards have been adequately addressed. The National Grid project representative will discuss the methods by which compliance will be achieved to National Grid safety requirements with the contractor.

6. An Emergency Call List shall be exchanged with the National Grid project representative for high or medium risk projects or as applicable. This list must contain 24-hour contact information for key contractor and project personnel, including the project representative and Safety representatives. This list should be distributed to all concerned, as determined by the project team, prior to the start of work. For contractors working on process safety assets who have an emergency response role, the emergency response plan shall be updated to clarify the contractor's role in the event of an emergency on site.

7. For routine maintenance services, a review of associated safety issues and specific facility issues, restrictions or practices, such as evacuation procedures, shall be discussed with the contractor upon initial hiring. Any changes in the facility that may affect the safety of contractor or National Grid employees or third parties must be communicated immediately.

3.5 Job Safety Briefs

Applies to: All contractors; as needed

1. Job safety briefs shall be documented in writing. Written job safety briefs, permits, and/or plans shall be available at the job site for inspection and retained for 30 days after the job is completed.

2. National Grid reserves the right to perform a safety stand-down with any contractor for purposes including, but not limited to: recent injuries, incidents or near misses; identified hazards at job site or equivalent, and for other reasons to communicate with the contractor crew.

3. Each crew shall conduct these job safety briefs prior to commencing work at the job location. A new job brief is required when there are changes to the day's work order or plan, when there are changes in weather conditions, when a new worker or company joins the crew, and if the crew members take any extended breaks (i.e. lunch breaks). Working alone: A contractor working alone need not conduct a job brief; however, the contractor must review the hazards associated with the job as if a formal job brief had been performed.

4. Each worker must have the opportunity to voice concern. The work cannot begin until each worker signs off on the job safety brief stating that they have discussed the work, raised any questions, and agree with the plan.

5. Visitors to the work site shall be asked to read and sign the job brief acknowledging they understand contents. Contractors shall review the job brief and discuss the elements of the hazards and mitigation steps with each visitor prior to entering the job site. If a visitor refuses to sign, the general foreman will note it on the brief and will not allow the visitor to enter.

6. SITE SIGNAGE: An assessment of the work site should be conducted by the National Grid project representative overseeing the work with the contractor to determine if site signage will be needed to protect site visitors, the public or any other persons entering the work site. If Site Signage is required at the site, the signage shall be posted at the main entrance to the work site. The sign shall direct all visitors to check in with the Person in Charge (PIC), be escorted to the designated safe area and advised of all work currently in progress. The visitor is expected to comply with all related safety requirements and sign off on the Job Brief before entering the work site.

3.6 Safety Meetings

1. In addition to job safety briefs, the contractor shall have regular safety meetings with their employees and subcontractors. Contractors performing high or medium risk work shall have weekly safety meetings, while low risk contractors, at a minimum, shall have safety meetings monthly and attendance must be documented.

2. The safety meetings shall include the following topics: statistics, incidents, near misses, updates on old business and new business raised. It will include the round table discussion by the workers and the action items discussed. Meeting minutes must be documented and shall include specific action items, their due dates, persons responsible and a completion date. This documentation shall be available for inspection during the project period, and for 30 days after the project is completed. For contractors working on Process Safety assets, meeting minutes from contractor shall be shared and discussed with National Grid site management.

3. Routine Safety meetings/calls between National Grid and the Contractor shall be coordinated on a regular basis. Safety meetings may include but are not limited to ESD/Compliance Assessments, Safety Briefs, Safety Day discussions and regularly scheduled calls to promote safety and best safety practices. Contractors working on Process Safety assets for more than 6 months shall schedule leadership visits to discuss process safety topics.

4. Contractors are to perform their own safety self-assessments.

5. Contractors working on process safety assets for greater than three (3) months, or as needed, shall hold project planning meetings to discuss short term and long term work items. Project planning meetings shall include safety performance monitoring against project targets and should include a National Grid SHE representative for jobs on Major Hazard Assets in addition to a National Grid site representative.

3.7 Incident Investigation

Applies to: All contractors (regardless of risk ranking)

1. All contractors are required to report any work-related incidents involving injury or illness to employees, the public or property damage to the National Grid project representative. The first priority is to ensure that anyone injured receives medical treatment. Examples of incidents may include, but is not limited to: injury, property damage, adverse public impact, near miss, a hazardous condition and road traffic collisions (RTC).

2. Contractors will then be responsible to perform an incident investigation immediately following the incident and document root cause/corrective actions in the ISN system and to National Grid.

Incident Response Steps

In the event of an incident, the contractor shall provide details of the incident to National Grid that follows the steps below.

1. Contractor supervisor collects basic information about the incident from the employee or witnesses:
    - What happened?
    - Who and how many people were injured?
    - What treatment was administered?
    - What was the nature and seriousness of the injury?
    - Where did the incident occur?
    - When did the incident occur (date, time of day)?
    - Were there any witnesses?

2. Contractor supervisor immediately calls the project representative or other National Grid point of contact. All incidents shall be entered into the Incident Management System (IMS) as soon as possible by the National Grid project representative or National Grid designee. When dialing 1-866-322-5594, the caller will be prompted to select option 2 for anything other than an employee injury.

3. Contractor shall conduct an investigation within 24 hours of the incident that will identify contributing factors and root cause analysis relating to the incident and the corrective actions that will be taken to prevent future occurrence. This information will be documented in the ISN system.

4. Contractor vehicle accidents occurring during the performance of work will also be investigated and reported to National Grid.

Other Reporting

National Grid may periodically request the following annualized data for all work activities limited to National Grid operations:

- Lost Time Incident (LTI) rate for workers
- Restricted Work rate
- OSHA Recordable Incident (ORI) rate

4.0 TECHNICAL SAFETY REQUIREMENTS

4.1 Personal Protective Equipment (PPE) Requirements – General

Applies to: All contractors (regardless of risk ranking)

1. The contractor and their employees, including subcontractors are expected to follow the same rules and protocols as National Grid personnel. Basic PPE attire at construction sites and other similar work zones include, at a minimum:

   - Hard hat
   - ASTM F2413 EH rated safety shoes
   - Safety glasses with side shields
   - Any contractor who is exposed to vehicular traffic shall wear ANSI 107 certified class 3 hi-vis vest or garment.
   - All contractors who are exposed to vehicular traffic and are exposed to energized electrical equipment or live gas are required to wear ANSI 107, class 3 hi-vis vest or garment, that also meets ASTM 1506 FR standard with a minimum Arc rating of HRC 1. All FR vests must be lime green/yellow. When FR clothing is required the FR vest shall be worn over appropriately rated FR clothing. Please reference the Gas PPE Matrix.
   - All contractors that are exposed to vehicular traffic, but will never be exposed to energized electrical equipment or live gas shall wear at a minimum ANSI certified class 3 vest or garment that is orange OR wear the FR vest in lime green/yellow.
   - ASTM 1506, HRC Category 1 FR vests must be in lime green or yellow. Any vest that does not meet the ASTM 1506, HRC 1 FR rating must be orange.

   Storm contractors that do not have a Contractor of Choice contract should follow their existing practices and rules. All other contractors shall refer to the US Department of Transportation's Manual on Uniform Traffic Control Devices (MUTCD) to determine the correct class of hi-vis clothing / vests.

2. The contractor shall ensure that their employees and subcontractors use protective safety toe footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards. In

addition, during inclement weather conditions or adverse events, the addition of anti-slip footwear or outer foot wear may be appropriate.

3. Guidance for additional PPE is referenced in other sections of this document.

4.2 Flame Resistant Clothing Requirements

Applies to: All contractors; as needed

1. Flame Resistant (FR) clothing shall be worn when personnel work on energized equipment/lines or when distance and position will expose the worker to electric arc or flame hazards. FR clothing shall also be worn during live gas work as outlined in the gas PPE Matrix (Gas Policy SHE01001) and within LNG operations locations as required. FR clothing also includes arc- resistant rain gear. This additional ensemble may also be required as part of the job for contractor personnel. Contact a National Grid representative for a copy or to view the PPE matrix.

2. FR clothing shall be worn as the outermost layer of clothing and when workers measure voltages, test or ground electrical equipment/lines.

3. FR clothing shall be worn when work requires the use of rubber protective equipment or the use of insulated live line tools.

4. FR clothing shall be worn when workers control/operate electrical equipment over 50 volts at the device location or are within 10 feet of equipment which is being physically operated/ worked on by another worker.

5. Visitors are not required to wear FR clothing in substations or production plants unless they are engaged in electrical work. The National Grid project representative will be able to determine whether FR clothing will be required based on the specific contractor task. Note: Gas contractor FR requirements may differ slightly. Please refer to National Grid PPE Matrix for Gas operations within Gas Policy SHE01001 as needed.

6. FR clothing shall meet a minimum arc rating of 8 cal/cm^2 (HRC 2) for energized electrical equipment unless otherwise specified based on increased potential exposure as indicated in the Arc Flash Tables in H-807 *Arc Flash Analysis and Mitigation* program.

7. Additional FR clothing protection is required when performing work on the distribution system in NY North and New England (legacy National Grid) stations. Contact a National Grid representative for a copy. (NG

Employees: If the link does not work, copy and paste the URL into your internet browser) Arc Flash Awareness and Mitigation (sharepoint.com)

8. Contractors who may be involved with tasks requiring the implementation of this program shall be informed by National Grid. Contractors will be required to follow all aspects of OSHA and any other applicable regulation as it applies to the tasks they perform.

4.3 Rubber Gloves and Sleeves

1. Rubber glove use is required for work on all electrical apparatus at 50 Volts or greater. Rubber gloves shall be donned before the worker leaves the ground and shall be worn until the worker returns to the ground (commonly referred to as “ground to ground”, “cradle to cradle”)
2. Class 0 gloves are required for exposures up to 1000 Volts.
3. Class 2 gloves are required for voltages between 1000-15,000 Volts.
4. Rubber sleeves must be worn where work is conducted within the MAD of primary electrical apparatus that is not tested, de-energized and grounded.
5. For voltages 23 kV and above, workers can use specialized equipment or work practices as long as these workers have been appropriately trained and qualified. National Grid may request training records from the contractor.
6. Rubber glove exceptions for specific jobs (other than those listed in this section) are permitted only with the dated, written approval of a Division Director.
7. It is the contractor’s responsibility to wear class 2 rubber gloves when grounding trucks or equipment due to a possible difference in potential.

Exceptions

No rubber gloves are required:

- When working in a properly established equi-potential zone.
- When the operator remains at the same potential as the equipment by being off the ground and on the equipment.

- When a qualified worker performs transmission “hot stick” work on lines 69 kV or greater and no other energized wires are on the pole or structure below the worker.

- When work is performed on transmission structures carrying only energized conductors (115kV and above) and the Live Line Techniques are not being employed. While performing these activities, the worker shall utilize conductive clothing such as conductive gloves, boots, leg straps and/or any other applicable conductive clothing.

- When climbing a steel structure to perform structural reinforcements while maintaining MAD from energized conductors or apparatus.

- When climbing a steel structure to access an area that has been properly grounded.

4.4 Isolation of Energized Apparatus

1. **Non-Reclosing Criteria and Live-Line Maintenance and Construction:** The appropriate interrupting devices (breakers, reclosers, circuit switches, etc.) will be placed on NON-RECLOSING in accordance with National Grid tagging procedures.

2. **Tagging Out Lines or Apparatus**

   The National Grid Construction Supervisor or designee shall coordinate all switching and tagging in accordance with the most current EOP on Clearance and Control.

   Upon receipt of Clearance, the project representative will present the Contractor’s Person in Charge with the “Contractor Permission to Work Form” (Form NG0060), which states the specific apparatus that has been de-energized and that certain device(s) are tagged in the Protective Position and will remain so until the Contractor’s Person in Charge informs the construction supervisor or designee of the completion of the work utilizing the “Contractor Completion of Work” section of the “Contractor Permission to Work” form.

   The original transferred copy needs to be returned after the completion of work section is filled out & signed. In some cases the tailboard is outside & is susceptible to elements & damage; a copy shall be utilized in the field instead of the original.

No work will be performed until the "Contractor Permission to Work Form" is received from the construction supervisor stating that the equipment has been de-energized and a clearance to work has been given. The Contractors Permission to Work Form and a written grounding plan shall be attached to the crews Job Briefing and be kept at the work location.

After the "clearance" is received from the National Grid Construction Supervisor, the various substation conductor bus and equipment to be worked will be tested and "Grounds" installed. Grounds shall be rated for the fault current of the line/equipment being grounded. (Note: Rubber Gloves and FR clothing are required when installing and removing grounds). The contractors "Person in Charge" (Construction Supervisor/General Foreman) shall be responsible for determining the location and number of grounds.

Vehicles and equipment may utilize a single 4/0 cu for grounding inside the substation. Employees working on de-energized lines and equipment shall always work between grounds.

Prior to the application of any personal protective grounds, the circuit to be worked on must be tested for the presence of voltage using an approved potential detector. The worker must verify the detector is in operating order prior to and after testing for voltage. MAD must be maintained during the testing, and appropriate PPE shall be worn. Testing for voltage shall be done at the point where the grounding devices are to be attached. All phases of the circuit to be worked on shall be tested at each location that grounds are installed.

When an Air Gap is required to create a work zone, the component (a tap) shall be removed in whole from the system unless removal of the component is impracticable or creates an additional hazard based on National Grid management in charge of the job. If the component (a tap) is deemed impracticable to be removed in whole it shall be disconnected from one end, isolated from all other conductors and properly secured to ensure accidental energization will not create a hazard. When National Grid switches out lines or apparatus, any grounds that may be installed shall only be considered a visual reference, and shall not be considered a means to protect the Contractor's employees. The Contractor is responsible to install their personal grounds, in accordance with all OSHA, Federal, State and local safety procedures. National Grid may provide guidance on the minimum size of the grounds to be used based on circuit available fault current. Refer to *Electric Operating Procedure D002,* for applicable grounding size. Ground rods shall be fully driven into the earth away from

the workers and work area. T-Bar ground rods are not to be used on National Grid property.

The National Grid Construction Supervisor shall review the contractor's plan for the quantity and locations of grounds, ensuring that the work the contractor is performing is between grounds, covering all potential sources. All three phases shall be grounded. (In stations, from each phase to the station ground grid). Grounds shall be placed as close to the work area as reasonably possible, between the work area and all potential sources of inadvertent energization. A copy of the grounding plan shall be kept with the job safety brief.

It is the contractor's responsibility to account for all their grounds. The contractor shall provide, maintain, and enforce a ground tracking program suitable to National Grid. In the instance of a zone expanding/collapsing, remaining grounds shall be listed on the Contractor Permission to Work Form and verbally communicated to the construction supervisor.

3. Grounding Mobile Equipment

When mobile equipment requires grounding, it shall be solidly grounded by means of appropriate sized copper cable while using rubber gloves. The cable shall be fastened to a securely attached clean metallic portion of the equipment, or shall be fastened to a grounding stud provided for the purpose at one end and an adequate ground at the other end.

Non insulated booms such as digger derricks that have the possibility of encroaching the MAD shall be grounded and barricaded. The ground is to trip the circuit and the barricade is to protect anyone who may become in contact with the truck during this energization.

4. Minimum Approach Distance (MAD)

Refer to OSHA 29 CFR 1910.269 for more information and details regarding qualified and unqualified workers.

4.5 Appointment of a Safety Observer

A safety observer shall be required if an employee (operator) determines that it is difficult to accurately determine the distance between the equipment (minimum approach distance) and energized parts. The Safety Observer shall never be a substitute for minimum approach distance (MAD), personal protective equipment

(PPE), insulate/isolate techniques or work area identification as a form of employee protection.

The person in charge of the work (contractor or National Grid), shall appoint a qualified employee or employees to perform the task of a safety observer. The personal in charge shall:

1. Ensure a documented job brief is completed and includes the name of the safety observer, additional subjects such as the location of gas lines, energized equipment, in or adjacent to the work area and the limits of any de-energized work area
2. Discuss the scope of work and communication techniques used to warn or notify the equipment operator of hazardous conditions.
3. Communicate any changes to work and job completion to the safety observer
4. Select another safety observer if there is a need for the existing observer to have break in service.

The safety observer is a qualified employee who has been appointed by the person in charge based on the hazard assessment and the job brief. The safety observer shall:

1. Observe the worker performing the task/activity until all hazards have been eliminated or the task/activity has been completed
2. Have shown proficiency in the task/activity being observed and have a full understanding of the job and the hazards associated with the task/activity.
3. Remain continuously focused on the task/activity being performed and not perform or assist any other job activities while observing the worker performing the task/activity
4. Notify the person in charge if there is a need to have a break in service. Work must stop until a new observer is appointed or the safety observer returns.

A safety observer shall also be required when a critical lift is being performed. A critical lift plan shall be required during the following circumstances:

1. An object is lifted over energized apparatuses or assets where a failure of the lifting equipment or rigging could result in a significant safety hazard or cause significant disruption in service to National Grid customers.
2. The crane or other lifting apparatus is anticipated to be operated above 80% of its rated capacity for the specific load chart for the lift.

3. A man basket (pinned or suspended) is to be utilized. All fall protection rules shall be followed when in a man basket.
4. Two cranes will be used in concert to lift a single object
5. Internal substation construction involving all power transformers, control houses, capacitor banks and transmission breakers.
6. Lifts in LNG or Gas plants where a hazard assessment or job brief identifies a significant risk.
7. The lifted load will be less than twice the minimum approach distance (MAD) of the nearest energized part. Until a qualified electrical worker confirms the MAD, loads and equipment shall maintain a 20 foot distance. Once nominal voltage is established, the MAD will be according to OSHA tables.
8. The lifted load is hoisted over buildings or the general public.

4.6 Work Zone Traffic Control

1. If work activity is on or near a road, the contractor and their subcontractors shall comply with all applicable parts of the most current US Department of Transportation's Manual on Uniform Traffic Control Devices (MUTCD), state, local Work Zone Traffic Control requirements and the National Grid Work Zone Traffic Control Manual. Please contact your National Grid representative for a copy of the manual found in the Safety Homepage on the Grid:home.

2. If pedestrian traffic is disrupted, pedestrians should be provided with a path that is reasonably safe, convenient and accessible. Pedestrians should not be led into conflicts with work site vehicles, equipment or operations.

3. If working in areas covered by state permits issued to National Grid, contractors shall comply with the provisions (work practices and notifications) of the permit language. These permits must be available on the job site upon request.

4.7 Qualified Gas Worker

Applies to gas projects/activities

1. Gas contractor employees will be operator qualified as required and defined according to the Code of Federal Regulations, Transportation, 49, Subpart 192.801 through 192.809.

2. Until these qualified employees have demonstrated proficiency in the work practices involved, they are considered employees undergoing on-the-job training and must be under the direct supervision of a qualified person at all times. According to the definition of a “qualified employee”, the employee also must have demonstrated an ability to perform work safely at his or her level of training.

3. National Grid requires contractors with gas qualified employees to provide documentation on how they qualify their workers.

4. Additionally any qualifications’ of contractor personnel shall be in full accordance with the Company’s Operator Qualification written plan, (OQ Plan) Refer to the most current list of covered tasks in accordance with National Grids’ Operator Qualification Program and the Northeast Gas Association, (NGA).

4.8 Qualified Electrical Worker

Applies to electrical projects/activities

1. According to 1910.269(a)(2)(ii), a qualified electrical employee must be trained and competent in the following prior to starting work:

    - The skills and techniques necessary to distinguish exposed live parts of electrical equipment
    - The skills and techniques necessary to determine the nominal voltage of exposed live parts
    - The MAD specified in 1910.269 corresponding to the voltages to which the qualified employee will be exposed
    - The proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

2. Until these qualified employees have demonstrated proficiency in the work practices involved, they are considered employees undergoing on-the-job training and must be under the direct supervision of a qualified person at all times. According to the definition of a “qualified employee”, the employee also must have demonstrated an ability to perform work safely at his or her level of training.

3. National Grid requires contractors with electrically qualified employees to provide documentation on how they qualify their workers.

4.9 Qualifying Non-Electrical Worker

Applies to: All qualifying non-electrical contractors working near energized lines and equipment; as needed

1. The contractor shall provide orientation for non-electrical workers entering and working within restricted areas such as a substation and those working near energized lines and equipment.

2. The information provided to these workers must meet the requirements of paragraph 1910.269(a)(2)(ii). However, the orientation and training may not be as comprehensive as the qualified electrical worker would be.

   They must know:

   - What is safe and not safe to touch in the specific areas they will be entering;
   - The maximum voltage of the area;
   - The MAD for the maximum voltage within the area;
   - Proper use of personal protective equipment and in the work practices necessary for performing their specific work assignments within the area.

3. Until these workers have demonstrated proficiency in the work practices involved, they are considered to be employees undergoing on-the-job training and must be under the direct supervision of a qualified person at all times.

4.10 Asbestos, Lead and other Hazardous Materials

1. Asbestos and lead materials associated with electrical and gas equipment includes, but is not limited to: cement-type cable covering, cable wrap, wire coatings, coal tar pipe wrap, and transite panels and conduits. Asbestos and lead materials may also be present in building materials including but not limited to: paint, mastics, caulking, insulation and roofing materials.

2. Where asbestos and other hazardous material is present and likely to be disturbed, the National Grid project representative and contractor shall coordinate how the asbestos, lead or other hazardous materials will be

managed and shall consult National Grid's Safety & Environmental department as appropriate.

3. Removal of this material must be done by individuals specifically trained and qualified to handle asbestos and lead. Refer to National Grid Safety Procedures, F-615, F-617 and F-619 for guidance on asbestos and lead handling and removals. For more information, contact a National Grid representative for a copy of these procedures.

Note: Contractors who will encounter asbestos or lead as part of their work shall reference in their safety plan how they will address this hazard.

4.11 Lift Plans for Work Near Energized Electrical Equipment

1. All work involving hoists, cranes or other lifting equipment **within 10' of energized electrical equipment** must have a detailed lift plan/procedure.

2. As a minimum Lift Plans shall include the following:

    a. Designated Operator and Signal person

    b. Detailed travel and flight path that ensures the boom and material being raised is controlled 100% of the time and will maintain the appropriate clearance

    c. Designated cover up and isolation to ensure employee and equipment safety in the event of an unplanned action or failure

    d. Emergency action plan with detailed instructions to respond to unplanned/uncontrolled event during the lift or positioning of the lifting equipment.

    e. Documented load weight and equipment lifting limits

    f. Rigging equipment and methods that will be used during the lifting. Sign off/approval from the management official responsible for the work

4.12 Fall Protection

1. Fall protection or fall restriction devices shall be used when working at heights over 4 feet. When using portable straight and extension ladders,

three points of contact shall be maintained. If 3 points of contact cannot be maintained a work positioning belt is required.

Step ladders shall be set up on level and stable surfaces, fully open with braces locked. Work positioning belts are not required for properly set up step ladders.

2. All fall protection shall be inspected before use each day to determine if equipment is in good working condition. Defective equipment shall not be used and shall be removed from service.

3. A worker may enter or exit an aerial lift (at heights above four (4) feet) provided that fall protection such as guardrails or a fall arrest system is used while the worker moves between the lift and the working surface. Before any such transfer is made, the employee shall be properly tied-off to an adequate support, the pole or structure prior to and in the direction of the transfer.

Exceptions to fall protection shall be in accordance with Federal & State requirements.

4.13 Herbicide Application

1. Vegetation spraying shall be conducted unescorted only by contractor employees who have been designated as a Qualified Electrical Worker, where applicable.

2. The spray applicator shall have ID cards issued by Security with background checks available from the contractor.

3. National Grid management shall require a schedule of the spraying in their areas.

4. Once spraying begins, the contractor must contact local management on a daily basis to inform them of progress or changes to the schedule.

5. The contractor shall post all stations with dated signs indicating when the station was sprayed. These signs should not inhibit access to the station.

6. The contractor shall ensure that any stored materials and equipment do not get covered with “overspray”. Overspray represents a substantial safety hazard and cannot be allowed.

7. When applying herbicides, contractor employees shall wear appropriate PPE in accordance with product labels.

5.0 UNDERGROUND OPERATIONS WORK

In addition to the other requirements referenced in this document, this section covers requirements that are specific to underground operations work.

5.1 PPE Requirements

All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0.

5.2 Enclosed Space Assessment, Ventilation, Entry and Rescue

Refer to the National Grid EOP-UG006 *Underground Inspection and Maintenance* and National Grid Safety Procedure I-902 *Enclosed Space Procedure* for more information regarding enclosed space requirements.

1. Contractors are required to follow all procedures in this document in regards to enclosed spaces (manholes, sidewalk vaults, etc.), including assessment, ventilation, entry and rescue.

2. Each enclosed space shall be tested prior to removing manhole lids and entry. Atmospheric testing shall be continuous for the duration of the entry using a calibrated, industry approved atmospheric tester.

3. When performing hot lead work or when indicated by atmospheric monitoring, engineering controls such as forced mechanical ventilation shall be used when working in National Grid manholes at all times.

4. All contractors who are qualified electrical workers will treat these spaces as “enclosed spaces” and follow non-entry rescue provisions.

5. In some situations a boom is allowed for retraction from an enclosed space. Refer to Safety Procedure I-902 for more information.

6. Steel cable or wire rope for non-entry rescue is prohibited.

5.3 Equipment Safety Inspection

1. Inspect underground facilities (manholes, vaults, hand holes, splice boxes, junction boxes, pad mount transformers, switchgear and submersible equipment, etc.) each time a crew performs work at one of these facilities. All separable components in these facilities shall be inspected by infrared instrumentation. A National Grid representative can provide details from the

National Grid EOP-UG001 *Infrared – Non-Contact Thermometer Inspection Requirement for Underground Equipment* for more information.

2. The infrared (IR) thermometer or camera shall, at a minimum, have a range of -25°F to 1400°F with a plus or minus 1% accuracy. For more details and current operating procedures, contact a National Grid representative regarding EOP UG001.

3. The format for data collected shall follow the National Grid EOP UG006 *Underground Inspection and Maintenance* requirements. Please contact a National Grid representative for more information.

4. "Touch Potential" testing of metal street lighting poles is required as a part of any maintenance work. For more information, a National Grid representative can provide a copy of the National Grid EOP G016 *Elevated Equipment Voltage Testing* and National Grid Work Methods Bulletin #04-26 *Touch Potential Testing of Metal Street Lighting Poles.*

5. Touch Potential testing results shall be recorded on the job safety brief and the manhole inspection form which shall be given to the National Grid Construction Supervisor or designee.

6. All contractors working for National Grid shall use materials and equipment in accordance with the manufacturing guidelines. It is the contractors' responsibility to understand the manufacturers' limits and prescribed use of their tools and equipment before each use.

7. Workers shall test and verify that the underground cable is de-energized and guillotine the cable if needed from outside the hole. Rubber gloves shall be worn at all times while performing this task.

6.0 OVERHEAD LINE WORK

In addition to the other requirements referenced in this document, this section covers requirements that are specific to overhead line work.

6.1 PPE Requirements

All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0. In addition, contractors will follow ground-to-ground and cradle-to-cradle use of rubber gloves while performing work on energized overhead lines. Any foreign wire, including those on a pole or structure constitutes

an energized source and requires the use of rubber gloves (ex: Cable TV, telephone, fire alarm wire, etc.).

6.2 Fall Protection

All contractors who climb structures such as wood poles or transmission towers shall utilize enhanced fall protection equipment (fall arrest devices) and techniques (ex: *Buckingham Buck-Squeeze, Miller StopFall* or *Jelco Pole Choker*). When working on wooden and steel structures, a full body harness and lanyard shall provide 100% fall protection at all times (100% tie off, Shepperd's Hook, etc.). Climbers shall never be allowed to drop or slide down a pole or structure more than two feet.

Exceptions to fall protection shall be in accordance with Federal & State requirements.

6.3 Pole/Structure Inspection

Contractor shall ascertain the structural integrity of the pole or other structure prior to installation, removal, repair or modification of the equipment on the structure.

1. Prior to climbing any pole, an inspection and test of the condition of any pole being climbed shall be performed. The weight of the employee, the equipment being installed and other working stresses (such as the removal or re-tensioning of conductors) can lead to the failure of a defective pole or one that is not designed to handle the additional stresses.

2. If the pole is found to be unsafe to climb or to work from, it must be secured so that it does not fail while an employee is on it. The pole can be secured by a line truck boom, by ropes or guys, or by lashing a new pole alongside it. [29 CFR 1910.269(q)] If measures cannot secure the pole, the contractor must cease operations and notify the National Grid Construction Supervisor or designee

6.4 Electrical Work Methods

1. Jumpers of any type shall not be used to keep transformers, risers or transformer banks energized for the purpose of changing potted porcelain cutouts. A National Grid representative can provide information to the National Grid Electric Operation Procedure (EOP) D001 *Cutouts – Open Type* for more information.

2. Potted porcelain cutouts must be changed out when work is being completed on a pole even if this is not planned in the scope of the work provided.

3. Properly rated and inspected slings, chains or tongs shall be utilized to move poles and equipment. Winch lines must not be wrapped around poles or looped around transformer ears to lift without a sling or chain.

6.5 Transmission Overhead Lines

1. For work on transmission circuits, red tape shall be placed around any energized pole, pole structure, or tower adjacent to the de-energized line.

2. When one circuit of a double circuit pole or tower line is de-energized for work, a red or orange flag shall be placed on the energized side of the pole or tower nine feet below the lowest energized conductor. In addition, a red or orange flag shall be placed on the lower cage on the side toward the energized circuit at each arm level as employees work on them or pass them.

3. All contractors using ATV's, UTV's or RTV's for transmission or forestry work, are required to follow all local OHRV requirements for PPE and driving safety. Training shall include classroom and in-field instruction as well as a formal driving assessment on an annual basis for each type of vehicle planned for use: i.e. UTV specific training for UTV's and ATV specific training for ATV use. All contractor employees must be fully trained and qualified before use. Proof of individual operator training certifications for each operator shall be available at all times. US DOT rated helmets and safety glasses/goggles are required for any vehicle that does not have a seatbelt and a roll cage. In equipment with a roll cage and seatbelt, operators can utilize a hard hat and chin strap.

4. At the end of each day, unless other arrangements have been made for an extended outage, grounds will be removed and the National Grid project representative will be notified that all personnel are "clear" of the conductor bus work and equipment.

5. Wherever transmission line workers "touch" wires, a personal ground shall be installed at the work area to establish an equipotential zone, unless workers are engaged in live-line barehand work (29 CFR 1926.964)

7.0 SUBSTATIONS

In addition to the other requirements referenced in this document, this section covers requirements that are specific to substations work.

For additional information, a National Grid representative can provide a copy of the National Grid Substation Maintenance Procedure SMP 499.01.2 *Protective Grounding Procedure* under the Substation Work Methods Grid:home page for specifics regarding substation grounding practices.

Grounding plans for substation, major distribution and transmission projects will be submitted to the National Grid construction supervisor a minimum of 1 week prior to construction for review. This plan will show the steps, work area limits and ground cable size and amount. Once reviewed with the National Grid and prior to starting the job, the plan will be reviewed by the contractors with all employees and subcontractors on the project.

The use of an “Equipotential” step/platform or a conductive mat is required for access and egress from the following:

a. Crane or any other equipment, including aerial lift equipment, that is connected to the substation ground grid and/or bonded to transmission line conductors when working outside of the station fence
b. In the rights-of-way
c. In areas inside the substation where there is no ground grid present.

When work is performed inside the substation and there is a ground grid available, the “Equipotential” step/platform or conductive mat is not necessary.

All vehicles shall be grounded and barricaded per OSHA standards and the National Grid Electric Operating Procedure G026 *Mechanized Equipment Grounding*.

Proper clearances shall be maintained from adjacent energized substation bus, energized portions of substation equipment and other transmission lines at all times.

Use of proper insulated tooling (shotguns and sticks) shall be utilized per NECA standard maintaining MAD.

7.1 PPE Requirements

1. All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0.

2. Contractors who perform any ground breaking activities in a substation within a pre-marked area will require Dig Safe marks to be in place; otherwise, the job must be suspended and the National Grid construction supervisor or project representative shall be notified of the condition.

3. When using non-insulated man-lifts, and if provided by the manufacturer, a secure point of attachment for lifelines, or lanyards or deceleration devices shall be utilized, independent of the means to support or suspend the employee. Workers feet shall also always remain on the floor.

7.2 Notification of Control Authority When Entering a Substation

1. When a contractor enters and exits a National Grid substation, the contractor shall ensure that the System Control Center is notified. While work is being conducted, gates must be monitored at all times or the gates shall be locked. For more information, contact a National Grid representative regarding National Grid EOPG022 *Substation Security*.

2. Unescorted entry in substations can only be provided to contractors who provide assurance that their employees and subcontractors are electrically qualified as specified in 29 CFR 1910.269. Refer to Section 4.0 of this document

3. All National Grid specifically identified bulk power stations will require NERC-CIP training, certification and approval prior to entry to those sites.

7.3 Substation Work Area Identification (SWAI)

1. Contractors who will be working in substations shall follow the SWAI procedure. National Grid will provide a copy of this procedure if required by the project. For more information, contact a National Grid representative regarding National Grid SMP499.10.2 *Substation Work Area Identification Procedure*.

2. Qualified contractors as referenced in section 4.8 of this document shall install their own work area identification. National Grid shall arrange work area identification for non-qualified workers as required.

3. Designated storage areas for items not being used will be posted in the yard and should be the only place these items are kept.

8.0 GAS OPERATIONS WORK

In addition to the other requirements referenced in this document, this section covers requirements that are specific to Gas operations work. For more information, contact a National Grid representative regarding National Grid General Safety Requirements SHE1001 *Gas Policy* which can be found following this link:
http://dc-gasweb1/MelSite/WMSafetyAll.asp .

8.1 PPE Requirements

1. All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0.

2. The contractor shall wear all appropriate PPE and Class 2 rubber gloves for personal protection when digging or probing within 2 feet of known electrical conductors and when the location of energized conductors is unknown.

8.2 Gas Operations

1. Any contractor who performs covered tasks shall be operator qualified (OQ) as defined in the DOT Title 49 CFR, Subpart N and all applicable state requirements pursuant to the state the contractor is working in. Additionally, any qualifications of contractor employees shall be in full accordance with the Company's Operator Qualification written plan, (OQ Plan) Refer to the most current list of covered tasks in accordance with National Grids' Operator Qualification Program and the Northeast Gas Association, (NGA).

    a. The Operator Qualified status of contractor employees must be regularly updated and accessible through the ISN system. This listing must detail employees' current tasks they are qualified for, the next recertification date, associated documentation and a documented annual acknowledgement in ISN on their qualified workers as referenced in section 3.1 of this document.

    b. Contractor personnel involved with covered tasks may require certification by National Grid and an orientation of the involved tasks and National Grid Company standards. National Grid reserves the right to validate contractor qualifications prior to performing Live Gas work.

    c. Atmospheres are to be tested with a properly calibrated Combustion Gas Indicator (CGI) or Gas Measurement Instrument

(GMI) in accordance with National Grid excavation procedures as required.

d. Each employee in an excavation shall be protected from cave-ins by an adequate protective system, such as sloping, benching or an appropriate shoring system. For more information, contact a National Grid representative regarding National Grid Safety Procedure M-1301 *Standards for Working in Excavations.*

9.0 FORESTRY AND VEGETATION MANAGEMENT

In addition to the other requirements referenced in this document, this section covers requirements that are specific to vegetation management work.

9.1 PPE Requirements

1. All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0.

2. Flame Resistant Clothing is not required per the applicable OSHA Forestry standard. Forestry contractors must instead wear natural fiber clothing when working within 10 feet of energized equipment.

3. Forestry contractors must wear a properly adjusted full-body fall protection harness connected to an appropriate lanyard when working from an aerial lift. The lanyard must connect to an attachment anchored to either the boom or bucket mounting hardware. Attachment points anchored through only the fiberglass portion of the bucket are not acceptable.

4. Forestry contractors will be required to wear chaps while operating a chainsaw or when assisting and/or working in close proximity to a chainsaw that is being operated.

5. Saws shall not be left unattended with the engine running.

6. When a contractor employee carries a saw, the engine shall be off and/or covered or the saw shall be carried with the blade to the rear and locked.

7. Tree crews will not be allowed to fly their buckets in between the primary and secondary cables if the MAD will be violated in process of doing so.

9.2 Equipment and Work Methods

1. Forestry contractors shall utilize fiberglass sticks and stick saws for work around energized equipment. Additionally, integrity tests shall be performed and documented annually. Test results and expirations shall be available on each vehicle as needed.

2. Forestry contractors shall perform and document dielectric testing of all aerial units annually. Test results and expirations shall be available on each vehicle as needed.

3. For lump sum or unit price mileage trimming projects, a single foreman may supervise up to four (4) bucket trucks on the same project. The minimum qualifications for the "lead" person on each of the other trucks shall be a Journeyman Tree Trimmer or equivalent (Qualified Line Clearance Tree Trimmer). At least one other employee on the truck shall be an OSHA defined, Qualified Line Clearance Tree Trimmer Trainee. For Upstate New York only, it is understood that a Qualified Line Clearance Tree Trimmer shall carry the title, wage and benefits as outlined in IBEW LU 1249's existing contract of a Journeyman Treeman and that a Qualified Line Clearance Tree Trimmer Trainee shall carry, at a minimum, the title, wage and benefits as outlined in IBEW LU 1249's existing contract of a Treeman Trainee, 2nd year.

9.3 Training

1. Forestry contractor management will be required to attend safety council meetings hosted by National Grid as required. The contractor shall ensure that all appropriate safety personnel for the National Grid territory are in attendance.

2. Forestry contractors shall implement and provide the required training and certification programs necessary to provide OSHA defined Qualified Line Clearance Tree Trimmers or Qualified Line Clearance Tree Trimmer Trainees. Contractors shall be able to provide the documentation relative to these training and certification programs upon request by National Grid. Forestry contractors shall provide an updated HASP by April 1st of each year for all work being conducted at National Grid.

3. All contractors using ATV's, UTV's and RTV's for transmission or Forestry work are required to follow all local OHRV requirements for PPE and Driving safety

10.0 LNG PRODUCTION, TRANSPORT AND HANDLING

In addition to the other requirements referenced in this document, this section covers requirements that are specific to LNG Production facilities.

All contractors working at LNG plants will sign in and out of plants daily in the contractors log book. All other gas supply facilities and subcontractors require authorization under the contractor management official. If required by the project, trained National Grid plant personnel shall initially, and as needed, review and re-issue as needed, a work permit process which shall which describe the work being performed, valves with their locations and Lock-out/Tag-out numbers.

10.1 PPE Requirements

1. All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0 and shall include FR outer clothing.

2. Cryogenic protective gloves/gauntlets and face shields are required when making connections to load / unload LNG. National Grid retains the right to enhance PPE requirements as conditions warrant. The use of additional PPE shall be based on the task performed and the PPE matrix for work in production plants.

10.2 Training

1. Contractors who transport LNG/propane at National Grid facilities are required to be certified in first aid/CPR and are required to complete frost-bite awareness training. Documentation of training records shall be maintained in the ISN system.

2. National Grid expects contractors working at LNG plants to meet the requirements of 49 CFR 193 Subpart H for health, training or experience and/or any applicable National Grid procedures that supersede the above requirements. Contractors shall provide documentation on their qualified workers, as referenced in section 3.1 of this document.

3. All Contractor personnel performing work in LNG plants must meet the requirements of the National Fire Protection Association (NFPA), part 59.

11.0 ELECTRIC GENERATION

In addition to the other requirements referenced in this document, this section covers requirements that are specific to Electric Generation.

11.1 PPE Requirements

1. All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0

2. Hearing protection is required when working anywhere inside a generation plant and/or outside the plant where noise may be excessive. Acoustic barriers shall be maintained by the contractor as needed.

3. Safety shoes with a minimum height of six-inches are required in Generation plants.

4. Contractors working in generation plants are required to wear 8-Cal clothing protection. For additional guidance, a National Grid representative can provide reference to Electricity Distribution Operations Grid:home webpage under Electric Generation's Policies and Procedures EGO-028 *Personal Protective Clothing* & EGO-029 *Personal Protective Equipment*.

11.2 Training

1. Required training may include; PCB's, asbestos, mercury, confined space awareness and excavation competent person requirements. HAZCOM is required by contractors working in generation plants as applicable.

2. Contractors who work at a National Grid Generation Station shall attend an orientation regarding plant safety and as required, US Coast Guard Maritime Security (MARSEC) policies.

3. Equipment training is required per federal, state and local regulations and National Grid procedures. Operators of any powered industrial vehicle must be qualified and documentation shall be documented.

11.3 Equipment & Excavations

1. All excavations shall be performed in accordance with EGO-0005 *Procedure for Excavation in National Grid Generation Facilities* and National Grid Safety Procedure M-1301 *Standards for Working in Excavations.* For additional information, contact a National Grid representative for copies.

2. Gasoline and diesel powered fork trucks shall NOT be used inside the plant or other enclosed facility. Only propane/electric fork trucks are permitted except where additional hazards may exist.

3. All wood products necessary for the work must be made of flame retardant material.

11.4 Equipment Isolation

For isolation of hazardous energy sources while working in Generation plants, please contact a National Grid representative regarding EGO-0010, *Control of Hazardous Energy Sources-Work Permit System.*

12.0 CIVIL CONSTRUCTION

In addition to the other requirements referenced in this document, this section covers requirements that are specific to civil construction work.

12.1 PPE Requirements

1. All contractors shall comply with the applicable PPE and WZTC requirements referenced in Section 4.0.

2. Rubber gloves shall be worn while carrying out work in and around energized or identified direct buried lines, live duct banks, transformer enclosures, manholes, switch gear and other electrical apparatus when performing civil investigations, installations or repairs.

12.2 Enclosed Space Assessment and Ventilation

Contact a National Grid representative regarding the National Grid EOP-UG006 *Underground Inspection and Maintenance* and National Grid Safety Procedure I-902 *Enclosed Space Procedure* for more information regarding enclosed space requirements.

1. Contractors are required to follow all procedures in this document in regards to enclosed spaces (manholes, sidewalk vaults, etc.), including assessment, ventilation, entry and rescue.

2. Each enclosed space shall be tested prior to removing manhole lids and entry. Atmospheric testing shall be continuous for the duration of the entry using a calibrated, industry approved atmospheric tester.

3. When performing hot work or when indicated by atmospheric monitoring, engineering controls such as forced mechanical ventilation shall be used when working in National Grid manholes at all times.

7. All contractors who are qualified electrical workers will treat these spaces as “enclosed spaces” and follow non-entry rescue provisions.

8. In some situations a boom is allowed for retraction from an enclosed space. Refer to Safety Procedure I-902 for more information.

9. Steel cable or wire rope for non-entry rescue is prohibited.

12.3 Equipment Safety Inspection

All contractors shall comply with the applicable equipment safety inspection procedures referenced in Section 5.3

12.4 Excavation Requirements

All excavation work shall be performed under the control of a competent person. All soils in National Grid territories are to be considered class “C”, considered unstable and shall require all excavations be performed in accordance with OSHA 1926.651, EGO-0005 *Procedure for Excavation in National Grid Generation Facilities* and National Grid Safety Procedure M-1301, *Standards for Working in Excavations.* For more information, contact a National Grid representative for a copy.

Crews that are performing Excavations shall include an excavation log with their job brief that states the soil type, expected depth and length as well as final depth and length. All required steps need to prevent collapse will be documented on this form as well prior to entry.

Protective systems shall be used for certain manhole installations. These scenarios are covered below:

- The hazard assessment, competent person and/or National Grid supervisor deems it necessary
- If an excavation for a manhole in a roadway is completed and installation of manhole and backfill is not able to be done before the day is complete, a protective system will be required before road plating
- Installation of any manhole 3 way or greater in size/

Where trench boxes are required to be built on site, the contractor shall submit a PE stamped plan and the location shall be designated on the excavation drawings.

All lifts (not limited to materials and equipment) shall be planned and rigged by a competent person. A lift plan shall be provided for all “critical lifts” and must be submitted by a qualified professional to the National Grid representative prior to the lift taking place.

12.5 Cable fault finding and replacements

For excavation work needed to support faulted cables and emergency cable locates, the use of Cable Avoidance Tooling (CAT) shall be used in addition to Dig Safe requirements as an added safeguard to further pin point unidentified buried cables.

For excavations within the tolerance zone, all hand digging in and around direct buried cables shall require basic PPE, non-metallic handled shovels, rubber gloves, FR clothing and EH rated work boots with Dielectric (DI) over shoes.

All excavation equipment shall be grounded in accordance with NG EOP G026. For additional information, contact a National Grid representative.

The use of GPR (Ground Penetrating Radar) shall also be required to verify the Dig Safe/811 locates after award of the project and prior to excavation. This shall include electric URD, UCD and Substation projects.

12.6 Technical Review

Where and when applicable, all trench and excavation work shall be reviewed and stamped by a civil PE in the state of record and will be executed under the supervision of a trenching and excavation competent person. All leading edges of trenches and excavations shall be appropriately demarcated, clearly posted and controlled to prevent unauthorized persons from entering and inadvertently falling into the excavation. All trenches and excavations shall be closed as soon as practical/possible. All excavations shall be fully controlled for the duration of the exposure by adequately substantial means to withstand the environment and conditions expected to be present.

All pot holing/test holing and exploratory excavations shall utilize vacuum excavation whenever near known underground utilities or hazards, and when the potential for unknown hazards such as live electrical or gas conveyances exist. When using vacuum extraction in combination with air blowing/air knife tools, all persons in the immediate area shall be wearing safety glasses in addition to a full face shields.

13.0 CONSTRUCTION PROJECTS AT CONTAMINATED SITES

In addition to other requirements referenced in this document, all work on contaminated sites must be conducted per the requirements of 29 CFR 1910.120, including the worker qualification and training requirements of 1910.120(e).

14.0 AVIATION

1. Helicopter Crews of two or more shall perform a preflight documented job brief.

2. Helicopter work shall require the use of aviation helmets for both the pilot and passengers.

3. Helicopter pilots and passengers shall participate in the "Flying in the Wire and Obstruction Environment" training prior to flight.

4. Helicopter pilots shall meet the following minimum flight time experience:
    a. 2000 hours as Pilot in Command or Second in command of a rotor craft
    b. 1000 hours in a turbine rotorcraft / helicopter
    c. 100 hours in a helicopter of the make and model to be utilized at National Grid
    d. 300 hours flight time in Wire Environments

For more information, contact a National Grid representative for a copy of EOP T012 *Helicopter Utilization & Notifications.*

15.0 TRANSPORTATION RISKS

Contractor shall define transportation related activities that can have potential process safety consequences. National Grid shall determine if additional risk assessment is needed and contractor shall participate in the assessment. Contractor shall modify their process to mitigate risk that is determined to be intolerable.

APPENDIX A: NATIONAL GRID CONTRACTOR RISK MATRIX

National Grid Contractor Risk Matrix			
Category	**Description of Work**	**Impact of Work**	**Examples to be included in this category (including, but not limited to)**
Medium / High Risk Exposure **Tier I** **Inclusion in ISN Program is Required**	Physical Work, activity, or service that is performed on National Grid property site or is performed off-site where Owner Client has responsibility and is liable for work performed. Includes, but is not limited to, any activity requiring confined space entry, elevated work, work on operating systems involving hazardous energy, work on contaminated sites, and most work requiring a general work permit, hot work permit, or confined space permit.	Work, activity, or service having: • A potential for causing a catastrophic operational incident; • Access to operations; and/or • A direct role in site operations or maintenance, where failure could result in serious harm to employee or public well-being, company assets, or the environment Also includes any Contractor personnel's job function which has no direct or very limited supervision for operational checks.	• Maintenance, Construction and demolition contractors • Chemical cleaning, tank cleaning • Electricians and Instrumentation Technicians • Movers • Welding • Heavy equipment operations • Well drilling and testing • Environmental investigation, remediation, monitoring activities • Hazardous waste handling and/or transport • Excavation • Food service and handling • Equipment Inspection (e.g., X-ray & other NDT) • On-site sampling / gauging activities (not including escorted storm water sampling) • Common carriers transporting Owner Client-owned LNG or petroleum products • Landscaping services • Snow Removal • Janitorial services

			• Vacuum truck affecting/involving process operations • Oil Spill Response Organizations (OSRO) • Work conducted in a high-risk area (i.e. substations, LNG plants, etc.) • Working at elevations greater than 4 ft (includes, but is not limited to): ○ Working in buckets (includes technical advisors) • Working on ladders (straight ladders, extension ladders or step ladders taller than 4ft)
Low Risk Exposure **Tier II** **Inclusion in ISN Program is NOT Required**	Work that is office based such as: • Consultants that do not perform work or activities as described in the Medium/High Risk exposure category • Offsite services • On-site vendor pick-up/delivery and repair services • Work performed by public and private utilities	Work, activity, or service having an indirect role and no, or limited, access to operations or maintenance where failure could result in serious harm to employee or public well-being, company assets, or the environment.	• Mail/package/part delivery or pick-up (e.g. UPS, Fed EX, vendor-specific) • Samples pick-up by laboratory/courier • Office machine servicing (copiers, printer, computer, etc.) • Laboratory apparatus servicing • Storm water Sampling Labs/Contractors (When Escorted by Owner Client personnel) • Deliver/supply services (vending machine, bottled water, laundry) • Municipal waste pick-up • General trash removal services • Off-site repair/fabrication shops (such as pump, safety valve, piping, vehicle)

	• Personnel on-site with Visitor Status, when escorted		• Telephone, electric, local municipal utility services • Regulatory representatives • Technical representatives • Engineering services (when escorted by Owner) • Auditors
A SHE VP can require any contractor to be part of ISN when deemed as a potential risk to National Grid			

Appendix C Daily Reporting

FIELD OBSERVATION REPORT

Project: Canastota Non-Owned Former MGP Site **Date:**
Engineer: GEI Consultants **Project Day:** ___
Contractor: _____ **GEI Project #: 034390**
Client: National Grid

Time of Arrival: **Time of Departure:**
Weather:

GEI Representatives

-

Contractor Representatives

-

Site Visitors/Other

-

Monitoring

-

CAMP

Station	TVOC	PM-10	Comments

Analytical Sampling

-

Material Management

-

Site Work

-

Equipment

-

Field Discussions/Decisions

-

Photographs

Appendix D Soil Management Work Plan

APPENDIX D – EXCAVATION WORK PLAN

A-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining subsurface soil and groundwater containing site residuals, the site owner or their representative will notify the Department. Currently, this notification will be made to:

Justin Starr, P.G.
Engineering Geologist
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7014
Justin.Starr@dec.ny.gov

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of soil containing site residuals to be excavated, and any work that may impact an engineering control.
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of constituents 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, in electronic format, if it differs from the HASP provided in Appendix B of this document.
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

A-2 SOIL Screening Methods

Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into subsurface soil known to contain or potentially contain site residuals. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during onsite development, such as excavations for utility work.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

A-3 STOCKPILE Methods

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

Stockpiles will be covered using polyethylene sheeting to reduce potential infiltration of precipitation, migration of wind-blown dust, and direct contact exposures. Stockpiles will be routinely inspected and damaged polyethylene sheeting will be promptly replaced. The stockpiles will be kept covered, except when excavation is taking place and material is being added to the stockpile.

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 New York State Department of Environmental Conservation (NYSDEC).

A-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.

National Grid, GEI and its subcontractors are solely 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.

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). All dump trailers, dump truck boxes, and rolloff waste containers (collectively referred to as "waste transport containers") used to transport material containing site residuals for offsite treatment/disposal will be lined with polyethylene sheeting (covered inside the entire container) prior to waste loading. The ground surface of any truck loading area will be covered in 6 mil (minimum thickness) polyethylene sheeting to protect the area from incidental spilling. In addition, plastic tarps equipped with shepherd hooks placed over the side of the waste transport container will be used while loading to minimize contact of materials containing sites residuals with the outsides of the containers.

Truck drivers will not be permitted to walk over waste material without the proper training or PPE.

A truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks (at least the truck wheels/tires) will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Alternatively, the contractor may provide means and methods of loading trucks to prevent getting materials on wheels and tires.

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.

A-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, and polyethylene sheeting will be used to line the inside of the entire container prior to waste loading. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, the materials shall be stabilized to prevent free liquids from forming.

All truck wheels/tires will be washed prior to leaving the site. The wash waters will be collected and disposed of off-site in an appropriate manner.

All trucks loaded with site materials will travel to the designated disposal facility taking into account: (a) limiting transport through residential areas and past sensitive sites; (b) using 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) providing for overall safety in transport.

Trucks will be prohibited from staging along the street outside the project site and will maintain compliance with the Statewide Idling Law, Subpart 217-3 as well as all other regional and local laws. Queuing of trucks will be performed on-site to minimize off-site disturbance. Entry and Egress points for truck and equipment transport to and from the site will be kept clean of dirt and other materials during the work.

A-6 Materials Disposal Off-Site

All soil/fill/solid waste 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. Characterization sampling will be performed as needed and will follow the guidelines presented in the NYSDEC Program Policy Document titled “DER-10 / Technical Guidance for Site Investigation and Remediation” (DER-10) issued May 3, 2010. If disposal of soil/fill 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, construction and demolition debris, recycling facility, etc.). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Construction Completion Report. This documentation will include waste profiles, test results, facility acceptance letters, manifests, bills of lading, and facility receipts.

Non-hazardous historic fill and soils containing site residuals that are taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted soil cleanup objectives (SCOs) is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

A-7 Stormwater Pollution Prevention

All erosion and sediment controls will be installed and maintained in accordance with the New York Standards and Specifications for Erosion and Sediment Control prepared for the NYSDEC by the New York State Soil and Water Conservation Society (NYS Standards and Specifications) (latest edition), unless otherwise noted. Additional erosion and sediment control measures beyond those described below may need to be provided to achieve the stormwater management objectives.

Refer to the NYS Standards and Specifications and the Design Drawings for additional information pertaining to material and installation requirements for the following erosion and sediment controls. Minimum requirements under the Stormwater Pollution Prevention Plan include:

- Barriers and hay bale checks will be installed around the entire perimeter of the construction area 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 NYSDEC. All necessary repairs will 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 will 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 will be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.
- Catch basin inlet protection will be installed and maintained around any existing catch basins, which have the potential for receiving construction-related stormwater until alternative precautions (e.g., grouting, plugging, or otherwise sealing prior to abandonment/removal) are in-place to reduce the potential loss of sediment-laden water through the existing storm sewer system.

- Excavated materials will be staged and covered with polyethylene tarps to reduce the potential for migration of stockpiled excavation materials (i.e., via stormwater runoff) to clean areas of the site and/or offsite areas. Stormwater runoff from stockpiled excavation materials will be collected in sumps, located within the material staging/containment areas, and will be sampled and managed in accordance with Section A-8 – Fluids Management.
- Decontamination Areas will be used for the decontamination of personnel and equipment prior to entering clean areas of the site and/or offsite areas.
- Stabilized Construction Entrances / Exits will be constructed to minimize the potential for tracking of sediments onto offsite areas.
- Dust Controls will be implemented to reduce the potential for the generation of fugitive dust. Appropriate dust controls will be implemented on an as needed basis, throughout the duration of the work, in accordance with the procedures outlined in Appendix A – the Community Air Monitoring Plan (CAMP), and Section A-15 – Dust Control Plan of the EWP.

Good housekeeping practices will be implemented at the site to reduce the potential for construction materials from becoming entrained in stormwater discharges from the site. Throughout construction, the site will be maintained in a neat and orderly condition.

A-8 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 full a full list of analytes (Target Analyte List (TAL) inorganic constituents; Target Compound List (TCL) VOCs and SVOCs, 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.

A-9 Community Air Monitoring Plan

Air monitoring will be performed during future intrusive activities at the site in accordance with the project-specific CAMP included as Appendix A in the Supplemental Work Plan. This will involve real-time monitoring for organic vapors and particulate matter less than 10 micrometers in diameter PM10). Monitoring will be performed at upwind and downwind locations and at the nearest occupied building.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and New York State Department of Health (NYSDOH) Project Managers. A flow chart of VOC action levels and required responses is included in the project-specific CAMP.

A-10 ODOR Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-site and for site workers. Specific odor control methods to be used on a routine basis will include water/BioSolve® spray, polyethylene sheeting (for covering excavation faces, material stockpiles, etc.), a perimeter misting system (e.g., Piion Flexi-Fog system), and/or vapor suppression foam. These products will be used on a routine basis as needed. In addition, steps will be taken to minimize the excavation surface area exposed at any one time. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls is the responsibility of GEI's subcontractor, and any measures that are implemented will be discussed in the Construction Completion Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) direct load-out of soils to trucks for off-site disposal; (b) use of chemical odorants in spray or misting systems; and (c) use of staff to monitor odors in the adjacent building and/or surrounding neighborhoods.

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

A-11 Dust Control Plan

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

Dust suppression will be achieved through the use of dedicated on-site equipment (e.g. water truck) for wetting roads, excavation faces, and stockpiles.

Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.

Gravel will be used on roadways to provide a clean and dust-free road surface.

On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

Travel speeds overhaul roads will be limited.

The number and size of excavation areas open at one time will be limited.

Excavations and materials in onsite staging areas will be covered using UV-resistant polyethylene sheeting.

A-12 OTHER Nuisances

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

Appendix E Field Sampling Plan

GEI Consultants

Consulting
Engineers and
Scientists

Appendix E

Field Sampling Plan

Supplemental Work Plan

Canastota Former MGP Site
Canastota, New York
NYSDEC Site # 727014

Prepared for:
National Grid
300 Erie Boulevard West
Syracuse, NY 13202

Prepared by:
GEI Consultants Engineering, Geology,
Architecture & Landscape Architecture
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Project #: 034390-1.1031

Table of Contents

Abbreviations and Acronyms ii

1. Introduction 1

2. Field Activities 2

2.1 Site Hazards 2
2.2 Field Book and Documentation 2
2.3 Excavation Confirmation / Documentation Soil Sampling 3
2.3.1 Sample Analyses 4
2.4 On-Site Fill Sampling and Analysis 4
2.4.1 Imported Fill 4
2.4.2 On-Site Re-Use 6
2.5 Field Instruments and Calibration 6
2.6 Field Equipment Decontamination and Management of Investigation-Derived Waste 6
2.6.1 Decontamination Area 6
2.6.2 Sampling Equipment Decontamination 6
2.6.3 Procedures 7
2.7 Management of Investigation-Derived Waste 7
2.8 Surveying 7

Appendix

A Standard Operating Procedures
1. FD-001 Field Notebook
2. FD-002 Field Observation Report
3. FD-003 Sample Management and Chain of Custody
4. FD-004 Photo Documentation
5. SC-001 Sample Collection
6. SC-002 Sample Handling
7. SC-003 Investigation Derived Waste
8. QA-001 Equipment Decontamination
9. QA-002 Field Quality Control Samples

Abbreviations and Acronyms

AOC	Area of Concern
ASTM	American Society for Testing and Materials
BOD	Biological Oxygen Demand
BTEX	Benzene, Toluene, Ethyl Benzene, Xylenes
CAMP	Community Air Monitoring Plan
CERCLA	Comprehensive Environmental Response, Cleanup, and Liability Act
CFR	Code of Federal Regulations
COC	Chain of Custody
DL	Detection Limit
DNAPL	Dense Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
DQO	Data Quality Objectives
EC	Engineering Controls
EIS	Environmental Impact Study
EPA	Environmental Protection Agency
FID	Flame Ionization Detector
FS	Feasibility Study
FWRIA	Fish and Wildlife Resources Impact Analysis
GAC	Granular Activated Carbon
GC/MS	Gas Chromatograph/Mass Spectrometer
GFAA	Graphite Furnace Atomic Absorption Spectrometry
GIS	Geographic Information Systems
GPR	Ground-penetrating Radar
HASP	Health and Safety Plan
HOC	Halogenated Organic Compound
HDPE	High-Density Polyethylene
HPLC	High-Pressure Liquid Chromatography
HSO	Health and Safety Officer

IC	Institutional Controls
ICP	Inductively Coupled Plasma Atomic Emission Spectrometry
IDW	Investigation Derived Waste
LEL	Lower Explosive Limit
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level (for EPA Drinking Water Standards)
MDL	Method Detection Limit
MGP	Manufactured Gas Plant
MSDS	Material Safety Data Sheet
NAPL	Non-Aqueous Phase Liquids
NCP	National Contingency Plan
NPL	National Priority List
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
QA/QC	Quality Assurance / Quality Control
QAPP	Quality Assurance Project Plan
QHHEA	Qualitative Health and Human Exposure Assessment
RAO	Remedial Action Objectives
RAP	Remedial Action Plan
RCRA	Resource Conservation Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RFP	Request For Proposal
RP	Responsible Party
SARA	Superfund Amendments and Reauthorization Act
SCGs	Standards, Criteria, and Guidance
SMP	Site Management Plan
SOP	Standard Operating Procedure
SOW	Scope of Work or Statement of Work

SPLP	Synthetic Precipitate Leaching Procedure
STEL	Short-Term Exposure Limit
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compounds
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound from Mass Spectrometry
TOC	Total Organic Carbon
TOSCA	Toxic Substance Control Act
TPH	Total Petroleum Hydrocarbons
TWA	Time Weighted Average
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
USGS	United States Geological Survey
VOC	Volatile Organic Compounds
WP	Work Plan
XRF	X-Ray Fluorescence

Measurements

ppm	Parts per million
ppb	Parts per billion
ppbv	Parts per billion by volume
ppmv	Parts per million by volume
bgs	Below Ground Surface
msl	Mean Sea Level
µg/L	Microgram per liter
µg/Kg	Microgram per kilogram
µg/m³	Microgram per cubic meter
mg/L	Milligram per liter
mg/kg	Milligram per kilogram
Mf/L	Million fibers per liter

1. Introduction

This Field Sampling Plan (FSP) presents the methods and procedures to be used by the Engineer or Owner's Representative to perform field activities on an as-needed basis at the Canastota Former MGP Site located in Canastota, New York.

2. Field Activities

The methods and procedures to be used, and field activities to be performed for the Remedial Action, are described below.

2.1 Site Hazards

Staff must work closely to coordinate any sampling in accordance with the Engineer's HASP and any additional safety requirements in place at the time of sampling as identified by the Owner's representatives. Potential on-site surface hazards, such as traffic, sharp objects, overhead power lines, and energized areas will be identified prior to initiation of the field work. The potential hazards at the site will be identified during a site reconnaissance by the project team on or before the day of the field activities. Additional safety measures necessary for the activities performed during the investigation are described in the site-specific Health and Safety Plan (HASP).

2.2 Field Book and Documentation

Field activities will be documented in the field book. Entries will be of sufficient detail to provide a comprehensive daily record of significant events, observations, and measurements. The field book will provide a legal record of the activities conducted at the site.

- Field books will be assigned a unique identification number.
- Field books will be bound with consecutively numbered pages.
- Field books will be controlled by the Site Manager while field work is in progress.
- Entries will be written with waterproof ink.
- Entries will be signed and dated at the conclusion of each day of field work.
- Erroneous entries made while field work is in progress will be corrected by the field person that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing the correction.
- Corrections necessary after departing the field will be made by the person who entered the original information. Corrections will be made by drawing a line through the error, entering the correct information, and initialing and dating the time of the correction.

At a minimum, daily field book entries will include the following information:

- Location of field activity
- Date and time of entry.

- Names and titles of field team members on site and site contacts.
- Names, titles of any site visitors, as well as the date and time entering and leaving the site.
- Weather information, for example: temperature, cloud coverage, wind speed, and direction.
- Purpose of field activity.
- A detailed description of the field work conducted.
- Sample media (soil, etc.).
- Sample collection method.
- Number and volume of sample(s) taken.
- Description of sampling point(s).
- Preservatives used.
- Analytical parameters.
- Date and time of collection.
- Sample identification number(s).
- Sample distribution (e.g., laboratory).
- Field measurements made during soil screening with the photo-ionization detector (PID).
- Reference information for maps, sketches, and photographs of the sampling site(s).
- Information pertaining to sample documentation such as:
    - Dates and method of sample shipments.
    - Chain-of-custody record numbers.
    - Federal Express or UPS air bill numbers.

Additional details related to site documentation are provided in the FD-001 Field Notebook Standard Operating Procedure (SOP) included in Appendix A.

2.3 Excavation Confirmation / Documentation Soil Sampling

Collection of soil samples may be required should excavations occur in the future to document the condition of soil remaining onsite and/or to confirm that the excavation activities have accomplished the remedial goals set forth in the ROD. The following will be used during soil sampling:

- Field book
- Project plans
- PPE in accordance with the HASP

- PID with a 10.2 or 10.6 eV lamp
- Camera
- Clear tape, duct tape
- Laboratory sample bottles
- Coolers and ice
- Shipping supplies

If excavation soil sampling is necessary, it is expected that the Contractor will notify the Engineer at least three days prior to the anticipated sample collection date and assist the Engineer with the sample collection by collecting soil with the excavator bucket from the final excavation depth and sidewalls, as necessary, and providing the material to the Engineer staff for transmittal to the appropriate laboratory glassware. A log of the sampling will be prepared which will include soil type and physical characteristics, as well as the presence or absence of visual evidence of MGP residuals. The soil classification will be performed with the methods provided in the SC-002 Sample Handling SOP in Appendix A.

2.3.1 Sample Analyses

The excavation bottom samples may be analyzed for the following:

- SVOCs by Method 8270.
- VOCs by Method 8260.
- Cyanide; and/or
- Any other parameters identified by the New York State Department of Environmental Protection and/or Owner's Representative.

The laboratory will prepare a Level 4 NYSDEC Category B deliverable package to allow for data validation and DUSR preparation. The Engineer will include the sample results package(s) in subsequent NYSDEC reporting. Sample Collection and Sample Handling SOPs (SC-001 and SC-002) outline the field procedures and are provided in Appendix A.

2.4 On-Site Fill Sampling and Analysis

2.4.1 Imported Fill

If imported fill is to be used on site, the Contractor will identify potential sources of imported material and will be responsible for demonstrating that the imported material meets the requirements for imported fill and is appropriate for use as backfill for the remedial excavation area.

The chemical sampling will be consistent with the requirements of Table 5.4(e)10 of the NYSDEC DER10 and also NYSDEC's guidance document titled *Guidelines for Sampling and Analysis of PFAS* (dated April 2023). Included in Appendix B of the NYSDEC

document, is a table from DER10 entitled "*Allowable Constituent Levels for Imported Fill or Soil Subdivision 5.4(e)*" [NYSDEC, 2010a]. The samples will be analyzed for the COCs identified by NYSDEC DER10 (further described below). Samples will also be analyzed for Per- and Polyfluoroalkyl Substances (PFAS) in accordance with NYSDEC's PFAS guidelines. Discrete and composite sampling frequency for imported fill will be based on the estimated volume of each type of imported fill required for the completion of the work and the recommendations provided in DER-10 Table 5.4(e)10. The analytical requirements for the granular fill soils are summarized as follows:

- **Composite Granular Fill Soil Sample** – Composite sample(s) of the fill material will be analyzed for:
    - SVOC TCL – EPA Method 8270.
    - Herbicides – EPA Method 8151.
    - Pesticides – EPA Method 8081.
    - Polychlorinated Biphenyls (PCBs) – EPA Method 8082.
    - Metals – EPA 6000-7000 Series (arsenic, barium, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc).
    - Total Cyanide – EPA Method 9014.
    - Per- and Polyfluoroalkyl Substances (PFAS) – EPA Method 1668.

- **Discrete Granular Fill Soil Sample** – Grab sample(s) of the fill material will be analyzed for VOC TCL – EPA Method 8260.

Samples will be handled consistent with the Sample Collection and Sample Handling SOPs (SC-001 and SC-002) and the SOP Supplement for PFAS Sampling (all provided in Appendix A). No composite samples for the VOC analyses will be permitted. The samples will be analyzed by a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory. The laboratory will prepare a Level 4 NYSDEC Category B deliverable package to allow for data validation and DUSR preparation. The chain-of-custody record for the sampling and the laboratory data packages, along with a completed NYSDEC Request to Import form will be submitted to the NYSDEC for review and approval prior to the import of the fill soil.

Non-soil fill materials (e.g. gravel, crushed stone or recycled concrete) may be imported without chemical testing, provided that they contain less than 10% by weight passing the No. 80 sieve and meet the requirements in DER-10, Paragraph 5.4(e)5 (or as subsequently updated by the NYSDEC [i.e., less than 10% by weight passing the No. 10 sieve and also the 100 sieves]).

The results of the backfill analyses will be compared to the allowable constituent levels by the Engineer. The results of the sampling will be provided to the NYSDEC for approval prior to importing the materials to the site. The Engineer will include the sample results

package(s) and NYSDEC's formal approval of the imported fill in subsequent NYSDEC reporting.

2.4.2 On-Site Re-Use

If on-site fill is anticipated for re-use, the analytical sampling described in Section 2.4 should also be performed on material in-situ prior to excavating/moving or in the stockpile that is proposed for re-use.

2.5 Field Instruments and Calibration

Field analytical equipment will be calibrated prior to each day's use and more frequently if required. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Instrument calibrations will be documented in the project field book and in an instrument calibration log. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all of the instrument manuals will be maintained on site by the Field Team Leader, and changes to instrumentation will be noted in the field logbook.

The following field instruments will be used during the investigation:

- PID (for health and safety during sampling).

2.6 Field Equipment Decontamination and Management of Investigation-Derived Waste

2.6.1 Decontamination Area

Decontamination will be performed consistent with the QA-001 Equipment Decontamination SOP (included in Appendix A) at the area established by the Contractor.

2.6.2 Sampling Equipment Decontamination

Required materials:

- Potable water
- Phosphate-free detergent (such as Alconox™ or Simple Green™)
- Dei-ionized water
- Aluminum foil
- Plastic/polyethylene sheeting
- Plastic buckets and brushes
- Personal protective equipment (PPE) in accordance with the HASP

2.6.3 Procedures

Prior to sampling, non-dedicated sampling equipment (bowls, spoons, interface probes, etc.) will be washed with potable water and a phosphate-free detergent (such as Alconox™). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc. The sampling equipment will then be rinsed with potable water followed by a de-ionized water rinse. Between rinses, equipment will be placed on polyethylene sheets or aluminum foil, if necessary. Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

2.7 Management of Investigation-Derived Waste

Any waste generated during the sampling will be managed as outlined in the SC-003 Investigation Derived Waste SOP (included in Appendix A).

2.8 Surveying

A survey of sample locations and/or excavation limits and elevations may be required. Survey will be performed by the Contractor if possible, or otherwise by a Survey subcontractor. Horizontal locations will be reported in the applicable New York State plane horizontal coordinates (North American Horizontal Datum 1983 [NAD83], NYS Central Zone), and latitude and longitude coordinates. Elevation data will be reported in North American Vertical Datum 1988 [NAVD88].

Appendix A

FD-001 Field Notebook
FD-002 Field Observation Report
FD-003 Sample Management and Chain of Custody
FD-004 Photo Documentation
SC-001 Sample Collection
SC-002 Sample Handling
SC-003 Investigation Derived Waste
QA-001 Equipment Decontamination
QA-002 Field Quality Control Samples

STANDARD OPERATING PROCEDURE

FD-001 Field Notebook

1. Objective

Describe methods for documentation of field activities.

Documentation of site activities is a crucial part of the field investigation process. The field notebook serves as the record of field activities performed or observed during the project. It provides a factual basis for preparing field observation reports, if required, and reports to clients and regulatory agencies. Example field notes are provided in Attachment A.

2. Execution

- Use a separate all-weather bound notebook for each site/location/project number. Spiral notebooks should not be used because pages can be easily removed.
- Write neatly using black or blue pen, preferably a waterproof pen. Use of pencil is also acceptable only with approval of the project manager, such as in but not limited to, certain field conditions [e.g., cold or wet weather].
- Write the project name, project number, book number (i.e., 1 of 3), and date on the front cover. On the inside cover, identify the project name, project number, and "Return Book To:" the office address of the project manager.
- Number all of the pages of the field book starting with the first entry.
- Record activities as they occur. Record only facts and observations, regardless of whether they appear to be relevant at that time.
- Identify conditions or events that could affect/impede your ability to observe conditions (e.g. snow-covered ground surface, inability to access areas of interest).
- Neatly cross out mistakes using a single line and initial them. Erasures are not permitted.
    - If an error is made on an entry in the field notebook, the individual who made the entry should make the corrections. The corrections must be initialed and dated by the person making the correction.
- Sign or initial and date the bottom of every page with an entry if the project requires such documentation.
- Place a diagonal line through unused portions of a page.
- Record the following information upon each arrival at the site:
    - Date/time/weather.
    - GEI personnel.
    - Purpose of visit/daily objectives.
    - People (client, contractor, landowners, etc.) present upon GEI arrival.

- Record the following information during the course of the day:
  - Conversations with contractors/subcontractors, clients, visitors, GEI staff, landowners (site or abutters). If possible, record complete names, titles, and affiliations.
  - Time of arrival and departure of individuals.
  - Activities as they occur.

- Additional examples of observations to record may include and are not limited to:
  - Type and quantity of monitoring well construction materials used.
  - Use of field data sheets or electronic logging equipment (e.g. boring logs, monitoring well sampling logs, etc.).
  - Ambient air monitoring data.
  - Field equipment calibration information.
  - Locations and descriptions of sampling points.
  - Contractor/Subcontractor progress.
  - Sample media (soil, sediment, groundwater, etc.).
  - Sample collection method.
  - Number and volume of sample(s) collected and sample bottle preservatives used.
  - Sample identification number (s) and date and time of sample collection.
  - Approximate volume of groundwater removed before sampling.
  - Any field observations made such as pH, temperature, turbidity, conductivity, water level, etc.
  - References for maps and photographs of the sampling site(s).
  - Information pertaining to sample documentation: bottle lot numbers/ dates, method of sample shipments, chain-of custody record numbers, and overnight shipping numbers.
  - Surveying data (including sketches with north arrows).
  - Changes in weather.
  - Rationale for critical field decisions.
  - Recommendations made to the client representative and GEI Project Manager.
  - Site sketch of conditions at the end of the day.
  - Summary of work completed/work remaining.
  - Allow time at the end of the day to complete entries in the notebook.

3. References

New Jersey DEP Field Sampling Procedures Manual, August 2005.

ASFE Daily Field Report for Geotechnical Field Observation, 2nd Edition (2001), ASFE, Inc.

4. Attachments

Attachment A - Example Field Notes

5. Contact

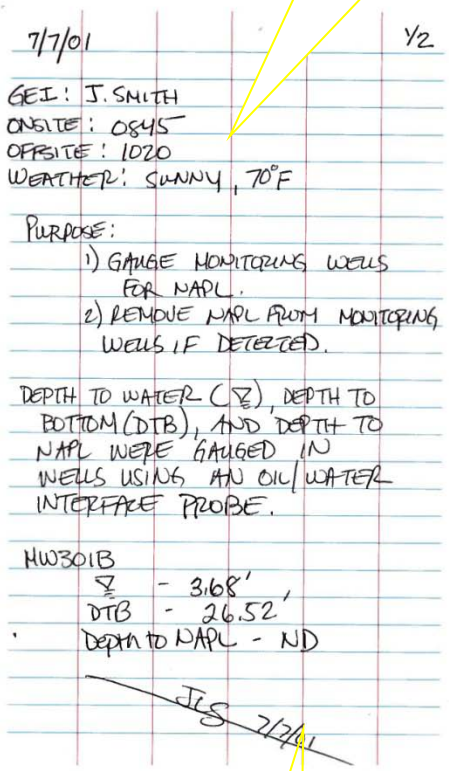
Melissa Felter
Leslie Lombardo

SOP FD-001

Attachment A – Example Field Notes

Start of each day includes:
- **Date**
- **Project Number**
- **People on site**
- **Purpose of Work**
- **Weather Conditions**

Each page is numbered



7/7/01 1/2

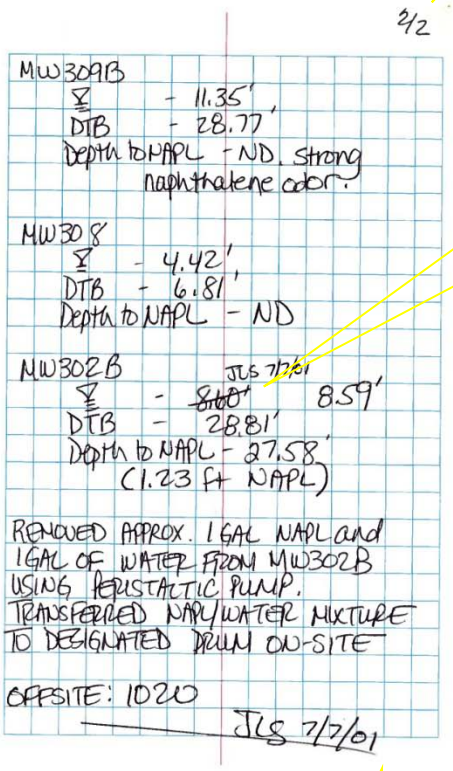
GEI: J. SMITH
ONSITE: 0845
OFFSITE: 1020
WEATHER: SUNNY, 70°F

PURPOSE:
1) GAUGE MONITORING WELLS FOR NAPL.
2) REMOVE NAPL FROM MONITORING WELLS IF DETECTED.

DEPTH TO WATER (▽), DEPTH TO BOTTOM (DTB), AND DEPTH TO NAPL WERE GAUGED IN WELLS USING AN OIL/WATER INTERFACE PROBE.

MW301B
▽ - 3.68'
DTB - 26.52'
Depth to NAPL - ND

JLS 7/7/01



2/2

MW309B
▽ - 11.35'
DTB - 28.77'
Depth to NAPL - ND. Strong naphthalene odor.

MW308
▽ - 4.42'
DTB - 6.81'
Depth to NAPL - ND

MW302B JLS 7/7/01
▽ - ~~8.60'~~ 8.59'
DTB - 28.81'
Depth to NAPL - 27.58'
(1.23 ft NAPL)

REMOVED APPROX. 1 GAL NAPL and 1 GAL OF WATER FROM MW302B USING PERISTALTIC PUMP. TRANSFERRED NAPL/WATER MIXTURE TO DESIGNATED DRUM ON-SITE

OFFSITE: 1020

JLS 7/7/01

Errors are single line crossed out and initialed

Blank Space crossed out and initialed

Bottom of each page signed and dated

GEI Consultants

STANDARD OPERATING PROCEDURE

FD-002 Field Observation Report

1. Objective

Describe methods to generate a Field Observation Report.

The Field Observation Report is used to record a summary of activities, observations, and decisions made during the day's field work. The daily field observation report serves as a permanent record of the day's activity for the Project Manager (PM), In-House Consultant (IHC), and/or client.

2. Execution

- If required, at the close of the day's field work, a Field Observation Report should be prepared by the individual responsible for the field notebook. This report should be completed before leaving work for the day. Contents of the report should include, at a minimum, the following information:
    - A record of person(s) present at the site, time of arrival, departure times (e.g., GEI, contractor(s), client, etc.).
    - A record of the daily objective(s) and the activities performed (e.g., drilled five borings in the overburden).
    - A summary of deviation(s) from the field plan or objectives.
    - A summary of field decisions made, who made them, and the basis for such decisions.
    - A diagram, sketch, and/or map showing the location and extent of the work or other significant observation(s) made during the day.
    - Recommendations that may result from field observations and actions that may result from implementation of those recommendations.
    - A summary listing and field sketch showing location(s) of field activity.
- Submit a draft report to the PM/IHC for review. Complete any editorial changes, sign, date, and submit the report to PM/IHC for approval/signature. Field Observation Reports should be written neatly. They are not required to be typed unless specifically requested by the PM.

3. Limitations

- The Field Observation Report is not a substitute for the field notebook.
- Not all projects require daily Field Observation Reports.
- The Field Observation Report should be based primarily on factual information. Opinions, if necessary, should be identified as such. Any speculation should be clearly noted in the report as such.

- The Field Observation Report should never be released to anyone other than the PM/IHC prior to review and sign-off unless explicitly authorized by the PM/IHC.

4. References

New Jersey DEP Field Sampling Procedures Manual, August 2005

ASFE Daily Field Report for Geotechnical Field Investigations, 2nd Edition (2001), ASFE, Inc.

5. Attachments

Attachment A - Example Field Observation Report

6. Contact

Melissa Felter
Leslie Lombardo

FIELD OBSERVATION REPORT

Project :	Guard Booth Upgrades	**Date:**	November 8, 2006
Client :	ACME Industries	**Report No.**	1
Contractor:	ABC Contracting	**Page:**	1 of 2
Subcontractor:	NA	**GEI Proj. No.**	99999-0

SOP FD-002 - Attachment A – Example Field Observation Report

Time of Arrival: 0700 **Departure: 1440** **Weather: Overcast, Raining, 55^{0}F**

Persons Contacted, Company
Jane Doe, ABC Contracting

GEI Representatives
Bill Smith

Purpose of Site Visit: To observe excavation of soils for new guard booth and sidewalk.

Observations:

1. **Excavation**
   a. Areas for guard booth and sidewalk were laid out by ABC with stakes, string, and spray paint. Locations were between the pavement and wetland area; no excavation occurred in the wetland area.
   b. Staging area for soil stockpile was located to the west of the excavation, along the fenceline; polyethylene sheeting was placed beneath the pile.
   c. HDPE membrane delivered to site; stored in garage area through the inside fence.
   d. ABC crew began hand digging area for sidewalk and guard booth. Sidewalk area measured 22 feet long by 4 feet wide by 4 inches deep. Guard booth area measured 12 feet long by 10 feet wide by 9 inches deep. Utility pole and bollard locations started today.
   e. Rain continued to get worse in the afternoon; ABC covered the entire excavation and soil stockpile with poly sheeting and secured the sheeting with grade stakes.

2. **Subgrade Preparation**
   a. Subgrade preparation for the sidewalk and guard booth areas at the site is complete.

3. **Dewatering**
   a. No dewatering occurred today.

4. **Air Monitoring**
   a. During excavation, I monitored the breathing zone of the workers with an organic vapor meter (OVM). No headspace readings were measured in soil samples S-1 through S-8.

FIELD OBSERVATION REPORT

Project :	Guard Booth Upgrades	**Date:**	November 8, 2006
Client :	ACME Industries	**Report No.**	1
Contractor:	ABC Contracting	**Page:**	2 of 2
Subcontractor:	NA	**GEI Proj. No.**	99999-0

Picture 1: Sidewalk excavation and bollard layout

By: Bill Smith	**Reviewed By:**

GEI Consultants

STANDARD OPERATING PROCEDURE

FD-003 Sample Management and Chain of Custody

1. Objective

Describe methods to label sample containers, manage the samples, and prepare Chain of Custody documentation for the samples. Sample transport is also addressed.

2. Project Setup

When setting up a sampling event, inform the recipients of the samples (laboratories) and recipients of laboratory results (data group and project managers). Discuss with the laboratory the sampling media, turnaround times, and reporting limits for appropriate regulatory criteria for the site. Include the data group on correspondence so that turnaround times, data validation, and project deliverable schedules can be tracked successfully.

- Laboratory - Number of samples, analyses needed: bottle orders and holding times, turnaround times needed, reporting limits needed for regulatory criteria.
- Data group - Number of samples, analyses requested, turnaround times and reporting limits requested, data validation needed, regulatory criteria to use for tabulating results, deliverables needed, and project name and number.
- Schedule - Inform the laboratory and Data Group of schedule delays, changes to analyses, and expediting.

3. Sampling Execution

- Review the work plan prior to sampling to determine the following:
  - Sample matrix and sampling method.
  - Required analysis and sample volumes.
  - Sample container type and preservative requirements.
  - Required analysis methods and/or report formats.
  - The turnaround time required by the project.
  - If the data will be sent directly from the laboratory to the data validator, Project Manager, or Data Group.
  - Holding time restrictions for sampling media and analytical methods.
  - Sample naming convention used for this project site.
- Sample labels should be filled out using a waterproof or permanent marker or pen. Required information includes:
  - Sample ID.
  - Date and time (military time) of sample collection.
  - Project number.
  - Sample preservatives.
  - Sampler's initials.
  - Laboratory analytical methods.

- Place the label on the jar or bottle, not on the cap. Sample custody begins at this time.
- Record the above information in the field notebook.
- Individually wrap sample jars with packing material, if needed. See SOP SC-002 for guidance on packaging samples for shipment to the laboratory by way of common carrier. Place samples in a cooler with bagged ice or freezer packs (blue ice) immediately after collection. Add sufficient ice or freezer packs to cool samples to approximately 4°C.
- Complete a chain of custody (COC) for the samples as described below. GEI or laboratory COCs may be used as long as they contain fields for all required sample information as described in Section 2.1.

3.1. Chain-of-Custody (COC) Completion

- Fill out COC neatly and in permanent ink. Alternatively, an Excel version of the GEI COC is available and can be filled out electronically.
- Certain analyses (i.e. air analysis by TO-15) require specialized, laboratory issued COCs. Make sure any specialized COCs are available before sample collection.
- Record the project name and number, the sampler's name(s) and the state where the samples were collected.
- For each sample, enter the sample identification number, date and time (military time) collected, the number of sample containers, and any additional information to fulfill project, client or regulatory requirements.
- Record the type of analysis (including laboratory method; e.g. EPA-SW846 Method XX) requested and the preservative (if appropriate) in the vertical boxes.
- Field duplicates should be anonymous to the laboratory, but must be recorded for use by the Data Group. To keep track of this information, link the field duplicate with the proper sample in the field notebook. If required by the Project Manager or Data Group, also document this information on or attach a note to the GEI copy of the COC.
- Trip blanks for large sites should be named similar to the samples they are collected with so that there are not two of the same sample name for the same site. For example, "OU1TB-122509" and "OU3TB-122509" would avoid any mistakes.
- Strike incorrect entries on the COC with a single line, followed by the initials of the person making the correction, the date, and the correct entry.
- When sample custody is ready to be relinquished, complete the bottom of the form with date and time (military time) and signatures of relinquisher and receiver of samples as indicated. The sample collector is always the first signature while the analytical laboratory is the final signature. Theoretically, all individuals handling the samples between collection and laboratory should sign the form; however, if a common carrier (i.e., Federal Express, UPS) is used for shipping, GEI must identify the carrier in the 'Received by' box on the

COC. If the sampler hand delivers the samples to the laboratory, the received box must be signed by the laboratory.

- If the samples are placed in a designated secure area (e.g. GEI sample fridge), note this location in the "Received by" box on the COC.
- GEI uses both single sheet and triplicate COCs. If using the triplicate COCs (white, yellow, and pink copies), the pink copy should be retained by the sampling personnel and provided to the Data Group for proper filing. The white and yellow copies should accompany the samples to the laboratory.
- If you are using the single sheet COC, make a copy of the COC after it has been signed by the lab courier and forward it to the Data Group.
- Prior to sample shipment by common carrier, the COC must be placed inside the cooler in a Ziplock bag or other watertight package.
- If a common carrier such as FedEx is used to transport the samples to the laboratory, include the carrier tracking number and identify the carrier in the "Received by" box on the COC.
- If a courier is used to transport samples to the laboratory (lab courier or GEI personnel), the courier signs the COC in the "Received by" box.
- Place a custody seal on the cooler if shipping via common carrier.
- Transport samples to the laboratory as soon as possible. It is preferable to transport the samples directly to the laboratory from the field. Samples brought back to the office for storage prior to submission to the laboratory must be kept cold (4° C).
- Unused sampling containers/media that are sent back to the lab should be included on a separate COC.
- After the samples are sent to the laboratory, the GEI copy of the COC must be forwarded to the Data Group: datagroup@geiconsultants.com.

4. Limitations

- Keep the number of people involved in handling samples to a minimum.
- Where practical, only allow people associated with the project to handle the samples.
- Always document the transfer of samples from one person to another on the COC.
- The COC should always accompany the samples.
- Give samples positive identification at all times that is legible and written with waterproof or permanent ink.
- When sending samples via a common carrier, use one COC per package.
- Where practical, avoid sending samples from more than one site with separate COCs in a single package.

5. References

New Jersey Department of Environmental Protection, Field Sampling Procedures Manual, August 2005.

Connecticut Department of Environmental Protection, Guidance for Collecting and Preserving Soil and Sediment Samples for Laboratory

6. Attachments

Attachment A - Example Chains of Custody
Attachment B - Shipping Info Pics

7. Contact

Brian Skelly
Leslie Lombardo

Chain of Custody Record

Example COC

STL Connecticut
128 Long Hill Cross Road
Shelton, CT 06484
Tel: 203-929-8140

Severn Trent Laboratories, Inc.

STL-4124 (0901)

Client: GEI	Project Manager: Dave Terry	Date: 12-31-07	Chain of Custody Number: 00452
Address: 455 Winding Brook Dr	Telephone Number (Area Code)/Fax Number: 860 368 5300 / 860 368 5307	Lab Number	Page 1 of 1
City: Glastonbury / State: CT / Zip Code: 06033	Site Contact: M. Felter	Lab Contact: Paul Mobart	
Project Name and Location (State): Carroll Gardens NY	Carrier/Waybill Number: FedEx 9383 7603 0879		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: VOC 8260B	SVOC 8270C	TO-15 + NAPHTHALENE	Special Instructions/ Conditions of Receipt
CGSB-01 (0-2)	12-31-07	1130				X	X						X	X		
CGSB-02 (3-4)	12-31-07	1250				X	X						X	X		
CGSB-02 (3-4) MS	12-31-07	1250				X	X						X	X		
CGSB-02 (3-4) MSD	12-31-07	1250				X	X						X	X		
CGSB-XX (5-6)	12-31-07	0800				X	X						X	X		
CGTB-123107	12-31-07	1400				TB				X			X			
CGGW-01	12-31-07	1430		X			X			X			X	X		
CGSG-01	12-31-07	0700-1500	X												X	CANISTER # 2613 REGULATOR # 779

Per NEW JERSEY: "CLP data package deliverables"

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other See Contract

QC Requirements (Specify): NYS Cat B ASP deliverable send to Lorie Mackinnon

Send EDD to datagroup@geiconsultants.com

	Date	Time		Date	Time
1. Relinquished By: Melissa J Felter	12-31-07	1600	1. Received By: FedEx Waybill 923117-4432	12-31-07	
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments: USED FLOW CONTROLLER FOR AIR SAMPLE INCLUDED

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

EXAMPLE COC

Chain-of-Custody Record

Laboratory: Accutest

Laboratory Job # (Lab use only)

GEI Consultants
400 Unicorn Park Dr.
Woburn, MA 01801
PH: 781.721.4000
FX: 781.721.4073

Project Information

Project Name: MWRA - Low Service Storage Tank
Project Location: Stoneham, MA
Project Number: 093400
Project Manager: D. Aghjayan

Send Report to: rseigener@geiconsultants.com
Send EDD to: labdata@geiconsultants.com

Page _1_ of _1_

MCP PRESUMPTIVE CERTAINTY REQUIRED – YES NO

If Yes, Are MCP Analytical Methods Required? YES NO NA
If Yes, Are Drinking Water Samples Submitted? YES NO NA
If Yes, Have You Met Minimum Field QC Requirements? YES NO NA

Lab Sample Number	GEI Sample ID	Collection Date	Collection Time	Matrix	No. of Bottles	Sampler(s) Initials	Preservative	PCBs	VPH Fractions Only	EPH Fractions Only	SVOCs	VOCs, % Solids**	Conductivity	RCRA 8 Metals*	TPH by GC/FID DRO	Sample Specific Remarks
							None / MeOH / None / None / MeOH / None / None / None	Analysis								
	093400-LS6-S5(19'-21')	12/29/2009	9:30	SO	3	JMR			x			x				
	093400-LS6-COMP (FILL)	12/29/2009	9:30	SO	1	JMR		x		x	x		x	x	x	
	093400-LS6-COMP (NATIVE)	12/29/2009	15:00	SO	1	JMR		x		x	x		x	x	x	
	093400-LS8-COMP	12/29/2009	14:00	SO	1	JMR		x		x	x		x	x	x	
	093400-LS9-S4 (8'-8'-5")	12/30/2009	14:30	SO	3	JMR			x			x				
	093400-LS9-COMP	12/30/2009	15:00	SO	1	JMR		x		x	x		x	x	x	

Sample Handling

Samples Field Filtered
YES NO NA

Sampled Shipped With Ice
YES NO

MCP Level Needed: GEI requires the most stringent Method 1 MCP standard be met for all analytes whenever possible.

Relinquished by: (signature)	Date:	Time:	Received by: (signature)
1. Joseph M. Reyes	12/30/09	16:30	1. GEI FRIDGE
2. GEI FRIDGE	1/4/10	1310	2. Naomi Stegman
3. Naomi Stegman	1/4/10	1310	3. [illegible]
4.			4.

Turnaround Time (Business days):

Normal _X_ Other ____
10-Day ____ 7-Day ____
5-Day ____ 3-Day ____

Before submitting rush turnaround samples, you must notify the laboratory to confirm that the TAT can be achieved.

Additional Requirements/Comments/Remarks:

Please use MA Landfill List

* Please run TCLP analysis for RCRA 8 Metals results that exceed the 20 times rule.

** Please use % solids sample for VOC and VPH analysis of 093400-LS6-COMP (FILL), 093400-LS6-COMP (NATIVE), 093400-LS8-COMP, and 093400-LS9-COMP

Chain-of-Custody Record

Laboratory:

Laboratory Job # (Lab use only)

GEI Consultants

455 Winding Brook Drive, Suite 201
Glastonbury, CT 06033
PH: 860.368.5300
FX: 860.368.5307

Project Information

Project Name/Number:

Project Location:

Project Contact:

Phone Number:

Page __ of __

Send Report to:

Send EDD to: datagroup@geiconsultants.com

Preservative

Analysis

Sample Handling

Samples Field Filtered

YES NO NA

Samples Shipped With Ice

YES NO

Deliverables:

If Yes, Have You Met Minimum Field QC Requirements? YES NO NA

Lab Sample Number	GEI Sample ID	Collection		Matrix	No. of Bottles	Sampler(s) Initials	Sample Specific Remarks
		Date	Time				

Relinquished by sampler: (signature)	Date:	Time:	Received by: (signature)
1.			1.
Relinquished by: (signature)	Date:	Time:	Received by: (signature)
2.			2.
Relinquished by: (signature)	Date:	Time:	Received by: (signature)
3.			3.
Relinquished by: (signature)	Date:	Time:	Received by: (signature)
4.			4.

Turnaround Time (Business days):

Normal _____ Other _____

10-Day _____ 7-Day _____

5-Day _____ 3-Day _____

Before submitting rush turnaround samples, you **must** notify the laboratory to confirm that the TAT can be achieved.

Additional Requirements/Comments/Remarks:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

PACKING SAMPLES FOR SHIPMENT BACK TO THE LABORATORY

A. Line cooler with bubble wrap and large plastic bag. Use absorbent pad inside the bag if bottles contain preservatives.

B. Wipe outside of bottles and put glass in individual bubble bags & seal. Place bottles & the temperature blank into cooler. Leave room for ice in between bottles & on top.

C. Place double bagged or loose ice randomly around bottles throughout the cooler.

D. Place large bag of ice or loose ice on top of the bottles. In warm weather, the cooler should be packed with as much ice as possible.

E. Close outer bag, compress excess air out of bag, twist top and knot. If necessary, use more bubble wrap to fill the dead air spaces. Place chain of custody (COC) and other paperwork in plastic bag and seal. Place on top of cooler.

F. Close cooler, place signed and dated Custody Seals over opening. Tape over the Custody Seal and seal cooler securely. Fill out overnight shipping waybill and attach to the top or handle of the cooler. Attach Saturday delivery stickers if needed. Ship according to DOT regulations.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

PACKING SAMPLES FOR SHIPMENT BACK TO THE LABORATORY

A. Line cooler with bubble wrap and large plastic bag. Use absorbent pad inside the bag if bottles contain preservatives.

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D. Place large bag of ice or loose ice on top of the bottles. In warm weather, the cooler should be packed with as much ice as possible.

E. Close outer bag, compress excess air out of bag, twist top and knot. If necessary, use more bubble wrap to fill the dead air spaces. Place chain of custody (COC) and other paperwork in plastic bag and seal. Place on top of cooler.

F. Close cooler, place signed and dated Custody Seals over opening. Tape over the Custody Seal and seal cooler securely. Fill out overnight shipping waybill and attach to the top or handle of the cooler. Attach Saturday delivery stickers if needed. Ship according to DOT regulations.

STANDARD OPERATING PROCEDURE

FD-004 Photo Documentation

1. Objective

Describe methods to document and retain photographic records.

Keeping a record of photographs taken is crucial to their validity as a representation of existing conditions.

2. Execution

- Photographs of a site, individual samples, or other observations should be taken using a digital camera.
- Set the camera to record the time and date for each photograph.
- All photographic records, along with the following information, should be recorded in the field notebook (SOP FD-001).
    - If applicable, the compass direction describing the direction the photograph was taken (e.g. looking southeast). This may not apply to photographs of individual samples.
    - Brief description of what the photograph is intended to show.
- The field notebook should note who took the photographs.
- The photographs should be electronically backed up on a computer or other data storage device.
- If photographs will be used in a report, memo, or letter, they should be placed on a photograph record template and the relevant information describing the photograph should be inserted into the caption section for each photograph.

3. Limitations

- Some clients and regulatory agencies require photographs of every subsurface soil sample collected. These photographs typically include a “whiteboard” which indicates the site, the boring ID, and the depth of the sample, while logging details are recorded in the field notebook. Under these circumstances, it is not necessary to include compass directions or descriptions.

4. References

New Jersey Department of Environmental Protection, Field Sampling Procedures Manual, August 2005.

5. Attachments

Attachment A – Example of Photo Documentation Template

6. Contact

Melissa Felter
Leslie Lombardo

Attachment A – Example of Photo Documentation Template
GEI Consultants, Inc.

Project: Project Name

Location: Project Location

Photographer: K. Barber
Date: 10/25/07
Photo No.: 1
Direction: N

Comments:
Entrance of site with tree mulching operations.

Photographer: K.Barber
Date: 10/25/07
Photo No.: 2
Direction: W

Comments:
On-site building built in 1936.

STANDARD OPERATING PROCEDURE

SC-001 Environmental Sample Types and Sampling Strategies

1. Objective

Describe types of samples and strategic approaches to sample locations.

Refer to Attachment A for guidance on compatible sampling materials.

2. Sample Types

Grab Samples

A grab (or discrete) sample is a single aliquot (part of the sampled media) collected from a single location at a specific time.

Surface soil samples are typically “grab” samples. Volatile organic samples are always grab samples because the least amount of sample disturbance is necessary.

Composite Samples

Composite samples are non-discrete samples composed of more than one aliquot collected from different sampling locations and/or at different points in time. Analysis of composite samples produces an average value.

Composite samples are frequently collected to characterize waste soil that has been stockpiled for eventual disposal. Several grab samples are collected from the stockpile and are blended together into a single sample.

Screening Samples

Screening samples may be grab or composite in nature. However, they offer potential advantages such as rapid results and low cost. The trade-off is that they may only provide results within a range and/or they may have elevated detection limits. Screening samples are most often used to evaluate presence/absence and/or indications of the potential magnitude of impacts.

3. Sampling Strategies

Generally, there are three sampling strategies: random, systematic, and judgmental sampling.

- Random sampling involves collection of samples in a non-systematic fashion from the entire site or a specific portion of a site.
- Systematic sampling involves collection of samples based on a grid or a pattern which has been previously established.
- Judgmental sampling is the collection of all other samples. This sampling might be from areas most likely to be contaminated, areas most likely to be clean, or areas where information is lacking.

Often, a combination of these strategies is the best approach depending on the type of the suspected/known contamination, the uniformity and size of the site, the level/type of information desired, etc.

4. Attachments

Attachment A - General Guidelines for selecting equipment

5. Contacts

Jerry Zak
Ryan Hoffman

General Guidelines for selecting equipment on the basis of construction material and target analyte(s)

[✔, generally appropriate for use shown; Si, silica; Cr, chromium; Ni, nickel; Fe, iron; Mn, manganese; Mo, molybdenum; CFC, chlorofluorocarbon; B, boron]

Construction material for sampling equipment		Target analyte(s)	
Material	**Description**	**Inorganic**	**Organic**
		Plastics[1]	
Fluorocarbon ploymers[2] (other varies available for differing applications)	Chemically inert for most analytes	✔ (potential source of fluoride)	✔ (Sorption of some organics)
Polypropylene	Relatively inert for inorganic analytes	✔ (not appropriate for Hg)	**Do not use**
Polypropylene (linear)	Relatively inert for inorganic analytes	✔ (not appropriate for Hg)	**Do not use**
Polyvinyl chloride (PVC)	Relatively inert for inorganic analytes	✔ (not appropriate for Hg)	**Do not use**
Silicone	Very porous. Relatively inert for most inorganic analytes	✔ (potential source of Si)	**Do not use**
		Metals	
Stainless steel 316 (SS 316)	SS-316-metal having the greatest corrosion resistance. Comes in various grades. Used for submersible pump casing.	✔ (Potential source of Cr, Ni, Fe, and possible Mn and Mo) **Do not use** for surface water unless encasted in plastic.	✔ Do not use if corroded[3]
Stainless steel 304	Similar to SS-316, but less corrosion resistant	**Do not use**	✔ Do not use if corroded[3]
Other metals: brass, iron, copper, aluminum, galvanized and carbon steels	Refrigeration-grade copper or aluminum tubing are used routinely for collection of CFC samples	**Do not use**	✔ Routinely used for CFCs Do not use if corroded[3]
		Glass	
Glass, borosilicate (laboratory grade)	Relatively inert. Potential sorption of analytes	✔ **Do not use** for trace element analyses. Potential source of B and Si	✔

[1]Plastic used in connection with inorganic trace-element sampling should be uncolored or white. Tubing used for trace metal sampling should be cleaned by soaking in 5-10 percent HCl solution for 8-24 hours, rinsing with reagent water (metals free) and allowed to air dry in mercury-free environment. After drying, the tubing is doubled-bagged in clear polyethylene bags, serialized with a unique number, and stored until used.

[2] Fluorocarbon polymers include materials such as Teflon™, Kynar™, and Tefzel™ that are relatively inert for sampling inorganic or organic analytes. Only fluoropolymer should be used for samples that will analyzed for mercury because mercury vapors can diffuse in or out of other materials, resulting in either contaminated or biased results.

[3] Corroded/weathered surfaces are active sorption sites for organic compounds.

STANDARD OPERATING PROCEDURE

SC-002 Environmental Sample Handling

1. Objective

Describe appropriate environmental sample handling procedures.

The procedures include collection and transport of environmental samples to a laboratory for chemical analysis. Appropriate sample handling should ensure that samples are properly:

- labeled and documented;
- preserved;
- packaged; and
- transported

2. Execution

- Prior to mobilizing to the field, select a shipper or arrange for a courier for sample delivery to the laboratory. If using a shipper (i.e., FedEx or UPS) determine the time constraints for pickup requests, the location and hours of the nearest shipping office, and any size/weight restrictions.
- A waterproof or permanent ink pen should be used for all labels. The label should have an adhesive backing and be placed on the jar or bottle, not on the cap. In addition, clear packing tape can be placed over the sample label to secure it to the bottle as moisture from the samples can loosen the label adhesive.
- Record the following information on the label and in the field notebook (See SOPs FD-001 and FD-003):
    - Project number
    - Sample identification (i.e. MW-201 or SS-2)
    - Date and time (military time) of collection
    - Sampler's initials
    - Analysis methods
    - Preservative, if present
- Pre-preserved laboratory jars are preferable and should be used whenever practicable. If sample jars are not pre-preserved, add preservative as appropriate.
- At each sampling location, samples should be collected in order of volatility, most volatile first. Samples collected for volatile analysis should be placed in sample containers immediately upon retrieval of the sample.
- Aqueous samples for volatile analysis should be collected without air bubbles.
- The collection and preservation method of soil samples for volatile analysis may depend on project, client, or state regulatory requirements. Check with your Project Manager and/or SOPs SM-001 and SM-002 where appropriate.

- Care must be taken to avoid getting soils on the threads of sample jars, which can cause a faulty seal.
- If compositing samples in the field, specify the basis for composite (i.e. volume, weight, spoon recovery, etc.) and record in the field book the procedure for compositing the sample.
- Once samples have been collected and labeled, place samples in a cooler with sufficient bagged ice or freezer packs (blue ice) (if allowed) to chill samples to 4°C. If using ice, use double-bagged ice.
- Complete the chain-of-custody (COC) (SOP FD-003).
- If transporting the samples by way of a shipper:
    i. The sample cooler should have water drains securely sealed with duct tape, both on the inside and outside of the cooler.
    ii. Place a layer of packing material on the bottom of the cooler as a cushion.
    iii. Individually wrap each sample bottle with bubble packing or suitable packing material and place the wrapped bottles upright in the cooler with sufficient packing material between samples to avoid breakage.
    iv. Methanol preserved samples for volatiles analysis should be packed so they remain upright with the soil completely covered by the methanol during transport.
    v. Place a layer of packing material on top of the sample bottles.
    vi. Place bagged ice or freezer packs on top of the packing material. Fill the remaining space in the cooler with packing material to eliminate the possibility of vertical movement of samples.
    vii. Place the completed and signed chain-of-custody form in a sealable plastic bag and place on top of the packing material in the cooler, or tape it to the inside lid of the cooler.
    viii. Fill out the appropriate shipping or courier forms and attach to the top or handle of the cooler. If necessary, place the proper shipping labels on the cooler. Have the courier sign the COC form (or write pickup by FEDEX, UPS, etc. with date and time). Place a signed and dated custody seal on the cooler.
- All samples should be submitted to the laboratory as soon as possible. In many cases, same day shipping will be required by the client or the project manager. Be clear on this before beginning the field work.
- A copy of the waybills should be kept by the field supervisor to track shipments if necessary.

3. Limitations

- If samples are shipped on a Friday, call the laboratory ahead of time to confirm that personnel will be at the laboratory to receive and log-in the samples.
- During warm weather, make sure to use plenty of ice in the shipping container.

- Field personnel should be aware of analyses which have short hold times and schedule sampling events and shipping accordingly. Shipment of samples for analyses with short hold times must be arranged for in advance. Refer to the project work plan, quality assurance project plan, or state/federal regulations for holding time and preservative information. Contact the laboratory ahead of time when shipping samples with short hold time to ensure the lab is prepared for these analyses.
- For glassware containing preservatives (e.g., HCl, HNO_3), take care not to overfill the container, thus flushing the preservative out of the bottle.
- Never composite samples for VOCs in the field. Collect individual aliquots and direct the laboratory to perform compositing, if needed.
- Collection of aqueous samples should not be performed over the opening of a monitoring well. Preservatives from overfilling, a marker pen or other objects could fall into the well.
- If the recharge volume for a monitoring well is low, completely fill all volatile vials and then collect the minimum sample volume required for each remaining analysis.
- During subsurface soil sampling, if the recovery from the split-spoon sample is inadequate, if appropriate, resample the bottom of the borehole to obtain proper sample volume.
- Laboratories will homogenize and test the contents of the sample container, unless directed otherwise. Samples should not contain rocks, twigs, leaves, etc… unless these materials are of interest.

4. References

New Jersey Department of Environmental Protection, Field Sampling Procedures Manual, August 2005.

Connecticut Department of Environmental Protection, Guidance for Collecting and Preserving Soil and Sediment Samples for Laboratory

Preservation Techniques for Volatile Organic Compound (VOC) Soil Sample Analyses, WSC#99-415. Massachusetts Department of Environmental Protection.

5. Contacts

Jennifer Belonsoff
Leslie Lombardo

STANDARD OPERATING PROCEDURE

SC-003 Investigation Derived Waste

1. Objective

Describe characterization and management of Investigation Derived Waste (IDW) resulting from site investigation activities.

IDW is solid and/or aqueous waste generated during environmental site investigations.

2. Execution

- Determine the suspected contamination type and impacted media based on previous investigations, available analytical data, and/or site history.
- Consider the following when selecting IDW management option(s):
    - Anticipated volume of IDW to be generated during on-site activities
    - Potential contaminants and their concentrations
    - Proximity to population centers and the potential for unauthorized site access
    - Potential exposures to workers
    - Potential for environmental impacts
    - Community concerns
    - Potential storage areas
    - Regulatory constraints
    - Potential on-site treatment options
    - Duration of storage
    - Client concerns or requirements
- Review IDW Management Options summarized in Attachment A for each media suspected of contamination.
- Select IDW Management Option(s) prior to the commencement of field activities that will generate waste materials.
- Include the selected IDW Management Option(s) in the Field Plan or other project documents.

Considerations and guidelines for IDW management for specific field tasks are provided below.

2.1. Test Pit Excavation

- Segregate contaminated soil from uncontaminated soil using visual and/or field screening methods.
- Use appropriate barrier (such as two layers of 6-ml plastic sheeting) for temporary stockpiling of contaminated soil adjacent to test pit.

- Backfill test pits with uncontaminated soil, unless otherwise directed by project manager.
- If directed by the Project Manager to return contaminated soil to the test pit, backfill soil in the same order as the soil was excavated from the test pit.

2.2. Boring/Monitoring Well Installation

- For auger borings, segregate contaminated soil (determined by visual and/or field screening methods) from uncontaminated soil during drilling. Segregate residual contaminated soil from split-spoon sampling.
- Auger cuttings or sediment generated by drive and wash may be spread around the ground surface at the boring location if it is acceptable to the client and the governing regulatory agency. If not, IDW may be placed in an appropriate area or container pending characterization and appropriate disposal. (A useful rule of thumb is to assume generation of one 55-gallon drum of cuttings for each 20 feet drilled with 7-¼-inch-I.D. augers).
- Segregate contaminated drilling fluid from uncontaminated fluid for rotary wash borings.
- Drilling fluid management options include pouring the drilling fluid on the ground near the boring location, if acceptable to the client and governing regulatory agency, or containerizing the fluid in drums or tanks.

2.3. Well Development/Sampling

Contaminated groundwater removed from wells by pumping or bailing for the purpose of well development and sampling may be poured on the ground near the well, if it is acceptable to the client and the governing regulatory agency. Otherwise, it should be containerized in drums or tanks.

2.4. Decontamination Fluids

Decontamination fluids may be poured on the ground in the vicinity of the well if approved by the project manager. Alternatively, the fluids may be containerized in drums or tanks.

2.5. Disposable Personal Protective Equipment

Disposable personal protective equipment (PPE) should be managed like any other IDW. However, with the clients' and project manager's approval, it may be removed from the site and disposed of as ordinary rubbish if it has not come into contact with contaminated materials.

3. Limitations

- The simplest IDW management option is to return the IDW to its source location.
- However, the selected IDW management options must meet state/federal regulations and have the client's approval. Consult with state/federal policies for IDW-related matters.

- The client is responsible for the disposal of IDW, should disposal be necessary.

4. References

Guide to Management of Investigation - Derived Wastes (April 1992), United States Environmental Protection Agency, Publication 9345.3-03FS.

Standard References for Monitoring Wells, Massachusetts Department of Environmental Protection, Publication No. WSC-310-91.

5. Attachments

Attachment A - Summary of Investigation Derived Waste Management Options

6. Contacts

David Terry
Leslie Lombardo

Attachment A: - SUMMARY OF IDW MANAGEMENT OPTIONS
GEI Consultants, Inc. Standard Operating Procedures
Management of Investigation - Derived Waste

Type of IDW	Generation Processes	Management Options	Remarks
Soil	Boring/monitoring well installation Test pit excavation Soil sampling	Return to source location immediately after generation	Acceptable, if authorized by the client, the governing regulatory agency, and the project manager.
		Spread around boring, test pit, or original source location	Acceptable, if authorized by the client, the governing regulatory agency, and the project manager.
		Containerize and temporarily store on site	Can temporarily store in stockpiles or covered containers (i.e. drums, roll-off containers). Stockpiles must be underlain by plastic sheeting and covered with plastic sheeting. Plastic sheeting must be secure. Storage consistent with state/federal regulations.
		Send to off-site, treatment or disposal facility within appropriate timeframes	Requires proper shipping documents (i.e. manifest, Bill of Lading, etc.), analytical characterization
		Store for future treatment and/or disposal.	Storage consistent with state/federal regulations. If a RCRA hazardous waste, must meet RCRA Container/Waste Pile/Tank requirements (see notes)
		Store temporarily awaiting laboratory analysis.	Storage consistent with state/federal regulations. Can temporarily store in stockpiles or covered containers (i.e. drums, roll-off containers). Stockpiles must be underlain by plastic sheeting and covered with plastic sheeting. Plastic sheeting must be secure.
Sediment/Sludge	Sludge pit sampling Sediment sampling	Return to source immediately after generation	Acceptable, if authorized by the client, the governing regulatory agency, and the project manager.
		Store temporarily on site.	Storage consistent with state/federal regulations.
		Send to off-site facility within 90 days	Requires manifests, analytical characterization
		Store for future treatment and/or disposal.	Storage consistent with state/federal regulations. If a RCRA hazardous waste, must meet RCRA Container/Waste Pile/Tank requirements (see notes)

Attachment A: - SUMMARY OF IDW MANAGEMENT OPTIONS
GEI Consultants, Inc. Standard Operating Procedures
Management of Investigation - Derived Waste

Type of IDW	Generation Processes	Management Options	Remarks
Aqueous liquids (groundwater, surface water, drilling fluids, other wastewater)	Well installation/development Well purging during sampling Ground water discharge - pump tests Surface water sampling	Pour onto ground close to well	Non-hazardous liquids only. Should not exhibit a sheen or separate phase product. Do not discharge to the ground up-gradient of the source location. Ensure that it is permissible by local, state, and Federal regulations Is acceptable to the client, the governing regulatory agency, and the project manager.
		Store temporarily on site	If a RCRA hazardous waste, must meet RCRA Container/Waste Pile/Tank requirements (see notes)
		Send to off-site commercial treatment unit within appropriate timeframes	Refer to State regulations for appropriate timeframe. Requires appropriate shipping documents (i.e., manifest, Bill of Lading), analytical characterization
		Send to POTW	Obtain appropriate discharge permit(s)
		Store for future treatment and/or disposal.	Storage consistent with state/federal regulations. Consistent with final remedial action
		Discharge to surface water	OK if it complies with state and federal regulations. Obtain appropriate discharge permit(s).
Decontamination fluids	Decontamination of PPE and equipment	Store temporarily on site	If a RCRA hazardous waste, must meet RCRA Container/Waste Pile/Tank requirements (see notes)
		Send to off-site facility within appropriate timeframes	Requires manifests, analytical characterization
		Store for future treatment and/or disposal. Storage consistent with state/federal regulations.	Consistent with final remedial action
Disposable PPE	Sampling, drilling, and test pit excavation observation, other on-site activities	Store temporarily on site	Dispose of appropriately after characterization
		Place in on-site industrial dumpster	Project-specific determination required – must be acceptable to client and project manager
		Send to off-site facility within 90 days	Project-specific determination required
		Store for future treatment and disposal.	Storage consistent with state/federal regulations. Project-specific determination required

Notes:

1) PPE - personal protective equipment
2) POTW - publicly owned treatment works
3) Generation processes listed here are provided as examples.
   IDW may also be generated as a result of other site activities.
4) RCRA Container/Waste Pile/Tank requirements:
   Containers; 40 CFR 264 Subpart I and 265 Subpart I
   Waste Piles; 40 CFR 264 Subpart L and 265 Subpart L
   Tanks; 40 CFR 264 Subpart J and 265 Subpart J

STANDARD OPERATING PROCEDURE

QA-001 Equipment Decontamination

1. Objective

This SOP describes methods used to decontaminate reusable sampling equipment for projects that require collection of organic and inorganic analytical samples. The goal is to minimize cross-contamination between samples. This maximizes confidence that field samples will be representative of specific locations and conditions.

Refer to the work plan or project manager to determine if different decontamination methods are acceptable.

2. Execution

- All contractor-provided equipment (augers, rods, spoons, backhoe buckets) should be decontaminated by steam cleaning or pressure washing prior to coming on site. If there is doubt about cleanliness of drilling tools, they should be decontaminated before use at the site.
- Sampling equipment decontamination is a sequential procedure consisting of the following steps:

    - Alconox-solution wash (or equivalent non-phosphate detergent)
    - Potable water rinse
    - A ten percent reagent grade nitric acid wash should be used to strip potential inorganic contaminants from sampling devices.
    - Laboratory grade 100 percent methanol, should be used to strip potential organic contaminants from sampling devices.
    - Three distilled/deionized water rinses.

- Alconox solution is a mixture of approximately 1 cup of Alconox per 1 gallon of potable water. Alconox solution wash requires scrubbing the equipment with a brush soaked in Alconox solution to remove visible contamination or dirt from sampling devices.
- Split-spoon samplers must be decontaminated prior to collecting each sample. The procedure follows:

    - Overall wash and scrub in a bucket of Alconox solution
    - Potable water rinse.
    - 10% nitric rinse
    - 100% laboratory grade methanol rinse
    - Three distilled-water rinses.

    The same procedure is applied to all devices that may contact soil or groundwater slated for analytical samples - spoons and knifes used to inspect or sample soils; water level indicators; oil/water interface probes.

Equipment used for well development of multiple wells must be decontaminated between wells.

Pumps and tubing should be flushed using a minimum of one gallon of Alconox-solution followed by a gallon of potable water. Some projects may require methanol (in much lower quantities) and distilled water instead of or in addition to the Alconox-solution and potable water.

For pumps and tubing, a final rinse of the sampling equipment may be performed with the water being sampled.

Equipment blanks measure the effectiveness of the decontamination procedures. Blanks should be collected per guidance provided in QA-002, Field Quality Control Samples.

3. Limitations

- Do not store the deionized/distilled water in polyethylene bottles, use Nalgene, glass, or Teflon. Polyethylene may leach phthalates.
- Do not attempt to decontaminate string or rope - replace it.
- Due to eye and skin absorption hazards, safety glasses and gloves must be worn when handling decontamination solvents.
- Decontamination procedures may also require modification based on state or federal requirements.
- Steam cleaning or pressure washing with potable water is generally an acceptable decontamination method for drilling equipment (i.e., augers). Check with the work plan.
- Dedicated equipment need not be decontaminated beyond initial decontamination prior to field use.

4. References

Environmental Response Team (ERT), US EPA. Sampling Equipment Decontamination, SOP No. 2006, Revision 0.0. August 11, 1994.

US EPA Region 9. Sampling Equipment Decontamination, SOP No. 1230, Revision 1.September 1999.

5. Contacts

Brian Conte
Bill Simons

STANDARD OPERATING PROCEDURE

QA-002 Field Quality Control Samples

1. Objective

Field Quality Control (QC) samples are used to monitor the reproducibility and representativeness of field sampling. The QC samples are handled, transported, and analyzed in the same manner as the associated field samples. QC samples may include trip blanks, equipment blanks, and field duplicates.

2. Execution

2.1. Trip blanks

- Used to monitor possible sources of contamination from transport, storage, inadequate bottle cleaning, or laboratory methodologies.
- Sample containers filled at the laboratory with analyte-free water are transported to and from the site, and are not opened until time of analysis.
- Trip blanks are stored with the sample containers prior to and after field activities and remain with the collected samples until analyzed.
- Generally, one trip blank per volatiles analysis (e.g. volatile organic compounds) shipment.
- Consider submitting a trip blank when sample shipment is by Fed Ex or other large carrier, or laboratory courier.
- Trip blanks should be recorded in the field notebook and on the chain-of-custody that same as all other samples.

2.2. Equipment blanks

- Equipment blanks (also known as equipment rinsate blanks) are used to monitor possible sources of contamination associated with sample collection. Monitors on-site sampling environment, sampling equipment decontamination, sample container cleaning, the suitability of sample preservatives and analyte-free water, and sample transport and storage conditions
- Equipment blanks are collected by pouring laboratory supplied or distilled or deionized water over sampling tools that have been decontaminated per the work plan, into sample containers.
- Equipment blanks are stored with the associated field samples until submitted for analysis.
- Generally collected when site conditions indicate site related contamination is a concern. Check project-specific work plan and/or quality assurance project plan for required frequency.
- Prepare equipment blanks immediately after the equipment is cleaned in the field and before leaving the sampling site.
- Prepare equipment blanks by rinsing the decontaminated sampling equipment set with the appropriate type of analyte-free water and collecting the rinse water in appropriate sample containers.

- If a potable water rinse is the typical final step, collect the equipment blank with analyte-free water after the potable water rinse.
- Equipment blanks should be recorded in the field notebook and on the chain-of-custody that same as all other samples.

2.3. Field Duplicates

- Used to evaluate the precision and representativeness of the sampling procedures.
- Field duplicates are two samples collected from the same location using the same procedures. Both samples are submitted to the laboratory as individual samples with different sample identification.
- Field duplicates from groundwater sampling for all analyses except volatiles analysis are collected by alternating filling sample containers from the same sampling device. Field duplicates for volatiles analysis are filled sequentially.
- Soil or sediment field duplicates are collected by homogenizing the sample for all analyses except volatiles. The homogenized sample is then divided into two equal portions and placed in separate sample containers. Field duplicates for volatile analysis are collected at two adjacent sampling locations.
- Each sample is assigned different sample identifications.
- Field duplicates are generally collected at frequency of 1/20 samples. Check project-specific work plan and/or quality assurance project plan for required frequency.
- All field QC samples should be labeled in the field and submitted “blind” to the laboratory – as if they are separate, primary samples.
- Field duplicates should be recorded in the field notebook and on the chain-of-custody that same as all other samples.
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2.4. Matrix-Spike samples (MS/MSD)

- Matrix spike and matrix spike duplicate samples (MS/MSDs) are environmental samples that are spiked in the laboratory or in the field with a known concentration of a target analyte(s) to verify percent recoveries.
- Matrix spike and matrix spike duplicate samples are primarily used to check sample matrix interferences. They can also be used to monitor error due to laboratory bias and poor precision. However, a data set of at least three or more results is necessary to statistically distinguish between laboratory performance and matrix interference.
- Generally, the laboratory is required to extract and analyze MS or MS / MSDs at a minimum frequency of 5% of samples being analyzed for the target analyte(s). If the project or client criteria require an MS or MS/MSD, collect sufficient volume in the appropriate containers, and designate the sample to be used as the MS or MS/MSD on the chain of custody.
- Calculate the percent recovery for all spiked analytes for both the MS and MSD. For MS/MSDs also calculate the relative percent difference (RPD). The

RPD for each spiked analyte is calculated using the amount detected not percent recovery. If your data will be subjected to validation, the % recovery and the RPD will generally be determined by the validator.

2.5. Typical QA/QC Frequency

- QA/QC frequency is determined by project, client or regulatory criteria and should be verified prior to sample collection. Generally, QA/QC samples are collected according to the frequency described below:

Duplicate Samples	One per sampling event, one per 10 samples collected, or one every two weeks, whichever comes first.
Equipment Blanks	For each equipment type that is not dedicated or disposable - one per sampling event, one per 20 samples collected, or one every two weeks, whichever comes first.
Trip Blanks	One per sample delivery group, or in each cooler containing VOC soil or aqueous samples, depending on project.
MS or MS / MSDs	One MS or MS/MSD per sampling event, one per 20 samples collected, or one every two weeks, whichever comes first.

3. Limitations

- Trip blanks must never be opened in the field.
- Trip blanks are usually for VOCs only because less volatile compounds are not likely to cross-contaminate other samples by simply being in close proximity.
- Laboratory-grade water must be used during the collection of equipment blanks.
- Field duplicates must have different sample identifications.

4. References

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (November 1986), U.S. Environmental Protection Agency Department of Solid Waste, Washington, D.C.

U.S. Environmental Protection Agency Office of Emergency and Remedial Response, 1990, Quality assurance/quality control guidance for removal activities: EPA/540/G-90/004, Sampling QA/QC Plan and Data Validation Procedures Interim Final, April, 1990.

5. Contact

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