# GARVIES POINT ROAD REDEVELOPMENT PROJECT
# GLEN COVE, NEW YORK

# SPLP INVESTIGATION / RED FLAG AREA CHARACTERIZATION WORK PLAN

**PREPARED FOR:**

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PWGC Project Number: RGI 1503

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P.W. GROSSER CONSULTING, INC.
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## APPENDICES

Appendix A October 30, 2014 Letter – Table 1 Source Definition
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LIST OF ACRONYMS

| Acronym | Definition |
|---|---|
| APR | Air-Purifying Respirator |
| ASP | Analytical Services Protocol |
| ASR | Air-Supplied Respirator |
| bgs | Below Ground Surface |
| BZ | Breathing Zone |
| CAMP | Community Air Monitoring Plan |
| CC | Captain's Cove |
| DER | Division of Environmental Remediation |
| DER-10 | Technical Guidance for Site Investigation & Remediation |
| DUSR | Data Usability Summary Report |
| EC | Engineering Control |
| EDD | Electronic Data Deliverables |
| EIMS | Environmental Information Management System |
| ELAP | Environmental Laboratory Accreditation Program |
| EM | Electromagnetic |
| GPR | Ground Penetrating Radar |
| GPS | Global Positioning System |
| GQS | Groundwater Quality Standard |
| HASP | Health and Safety Plan |
| HSM | Health and Safety Manager |
| IC | Institutional Control |
| IDW | Investigative Derived Waste |
| LT | Li Tungsten |
| NPL | National Priority List |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| PID | Photoionization Detector |
| PPE | Personal Protective Equipment |
| ppm | Parts Per Million |
| PWGC | P.W. Grosser Consulting, Inc. |
| QAPP | Quality Assurance Project Plan |
| QA/QC | Quality Assurance/Quality Control |
| RAR | Remedial Action Report |
| RFA | Red Flag Area |
| ROD | Record of Decision |
| SCBA | Self-Contained Breathing Apparatus |
| SDG | Sample Delivery Group |
| SPLP | Synthetic Precipitation Leachate Procedure |
| SWCL | Site Wide Cleanup Level |
| TAGM | Technical and Guidance Memorandum |
| USEPA | United States Environmental Protection Agency |
| UST | Underground Storage Tank |

## 1.0 INTRODUCTION

P.W. Grosser Consulting, Inc. (PWGC) has prepared the following Synthetic Precipitation Leaching Procedure (SPLP) / Red Flag Area Characterization Work Plan to outline procedures and a scope of work intended to determine the levels of arsenic and lead that may remain in place under engineering controls (ECs) that are protective of the Class GA Groundwater Quality Standard (GQS) specified in the New York State Department of Environmental Conservation's (NYSDECs) Division of Water Technical and Operational Guidance Series (1.1.1), and to further characterize / confirm contamination left in place as part of the Li Tungsten remedial action.

### 1.1 Project Background

The subject site (Site) is located along Herb Hill and Garvies Point Roads in Glen Cove, New York. The site includes several parcels in the Former Li Tungsten Site (LT) and the Former Captain's Cove Site (CC), all of which had environmental concerns as a result of past use. The SPLP work plan is separated into the LT and CC parts of the Site as they may have different hydrogeochemical conditions that would result in different SPLP responses. The SPLP testing is specific to the following parcels:

1. Former LT Site
    a. Parcel A
    b. Parcel Lower C
    c. Parcel Upper C
2. Former CC Site

The United States Environmental Protection Agency (USEPA) permitted arsenic exceedances to remain in the ground for several reasons as explained ahead. These are called either "Exempt Areas" or "Red Flag Areas" (RFAs) in its Remedial Action Report (RAR) and subsequent documents. They are found on Parcels Lower C and Upper C. The RFAs are reported to contain arsenic and / or lead content above the Record of Decision (ROD) Site Wide Cleanup Levels (SWCLs). As soil samples having varying amounts of arsenic and lead are needed for the SPLP tests, and the arsenic and lead levels in the RFAs need to be confirmed, sampling in these locations is proposed to satisfy these two objectives.

#### 1.1.1 *Li Tungsten Federal Superfund Site*

The LT Site is located at 63 Herb Hill Road in Glen Cove. Industrial operations at the site took place from approximately 1940 through 1984, under a succession of corporate entities, some of which were not related to

each other. The Site was listed on the USEPA's National Priority List (NPL), which is the list of Federal Superfund sites, on October 14, 1992.

Remedial actions performed at the site have been documented to have remediated the site to a standard acceptable for restricted-residential use with the exception of Parcel A which was remediated to commercial use. While the remediation was deemed complete by the USEPA, there were several areas that were exempted from remediation due to concerns for buried utilities. These are the RFAs / Exempt Areas and include the following:

1. LT Parcel Upper C: During the remediation performed on Parcel Upper C, the USEPA noted that certain areas along the western boundary of Parcel Upper C next to the Dickson Warehouse and along the eastern portion of the Dickson Warehouse could not be accessed without disrupting utilities or harming the warehouse and therefore not remediated. The existence of these areas was documented in the site RAR that noted ECs and Institutional Controls (ICs) should be put in place to ensure that these areas were appropriately managed / addressed moving forward.
2. LT Parcel Lower C: The USEPA has indicated that remediation of Parcel Lower C is not complete. The USEPA has acknowledged that they left behind high levels of arsenic and lead below the groundwater interface as well as contamination in the vicinity of a gas main along the fence line adjoining 1 Garvies Point Road.

### 1.1.2 *Captain's Cove New York State Superfund Site*

CC is located on the western end of Garvies Point Road in Glen Cove, New York. Beginning in the late 1950s and continuing until approximately the late 1970's, CC was predominantly used as a "community dump" by the City of Glen Cove for the disposal of incinerator ash, sewage sludge, rubbish, household debris, and creek sediments. The site was also used by local industry, including LT for the disposal of industrial wastes.

In 1986 the NYSDEC designated the property as a Class 2 Inactive Hazardous Waste Site (State Superfund Site) as a result of organic and inorganic contamination in soil and groundwater at the site. Portions of the site were later incorporated in the LT Federal Superfund Site as radionuclides were discovered in these areas and identified as Operable Unit 2 (OU-2, whereas the main LT area was named OU-1). Remedial actions performed at the site have been documented to have remediated the site to a standard acceptable for restricted-residential use.

Investigations performed since the completion of the remedial actions have identified arsenic and lead above the NYSDEC Source Material Definition established in the October 3, 2014 regulatory correspondence letter (**Appendix A**) at several locations throughout the site. Analytical results for metals in excess of the NYSDEC Source Material Definition from the subsequent post remedial confirmation sampling are summarized on **Figure 4**.

### 1.2 Preliminary Evaluation of Arsenic in Soil

A preliminary investigation was performed at the Site in January of 2015 to collect samples of arsenic and lead SWCL exceedances for SPLP testing to determine the concentration of arsenic that may remain in place under ECs without producing a leachate that exceeds the Class GA GQS.

The investigation included installing thirteen test pits and analyzing eleven soil samples for total arsenic throughout the Site to further evaluate site-wide arsenic concentrations. Soil analytical results confirmed elevated arsenic concentrations above 24 mg/kg in five soil samples. The three highest total arsenic concentrations were further analyzed using the SPLP method which showed that arsenic levels up to 187 parts per million (ppm) were protective of Class GA GQS.

### 1.3 March 25, 2015 Project Status Meeting

On March 25, 2015 a meeting was held with the NYSDEC, USEPA, New York State Department of Health (NYSDOH), City of Glen Cove, and RXR-Glen Isle Partners to go over technical aspects of the project. The regulatory agencies reiterated that they had concerns with several RFA's on the former LT Parcel C that were not remediated due to limitations at the time which included underground utilities, structural integrity of the Dickson Warehouse, and excavation depths that intersected the groundwater interface. The regulatory agencies also indicated that in order to develop a Soil Management Level for arsenic and lead that is protective of Class GA groundwater, further information would be needed and a statistical evaluation would need to be performed. The Soil Management Level is the level of arsenic and lead that can remain beneath ECs at the site.

During the meeting it was agreed that the LT Site and CC Site would need to be evaluated separately as they may have different hydrogeochemical conditions that would result in different SPLP responses.

## 2.0 SPLP INVESTIGATION / RED FLAG AREA CHARACTERIZATION SCOPE OF WORK

In order to characterize / confirm arsenic and / or lead concentrations in the RFA's and collect sufficient samples to identify a Soil Management Level for both CC and LT, a supplemental investigation will be performed as detailed below.

### 2.1 Geophysical Investigation

A review of the remedial close out reports for LT indicated that residual soil left in place in the RFA's was due to subsurface utilities encountered during remedial excavations. The remedial areas and subsurface utilities were documented in the report but were never surveyed or included in the as-built drawings of the site, so their exact location cannot be confirmed. The absence / presence of subsurface utilities within the property boundary of Parcel C will be confirmed with a geophysical survey using electromagnetic (EM) and ground penetrating radar (GPR) scans and a site survey.

#### 2.1.1 *Electromagnetic Survey*

The EM method uses the principle of EM induction to measure variations in electrical conductivity of subsurface materials, particularly buried metal objects. Significant contrasts in the electrical properties between non-indigenous materials and surrounding soil enable accurate delineation of buried waste materials, fill, and air spaces. The large EM response to metal makes this technique particularly well suited to identifying buried metal objects such as underground storage tanks (USTs), metallic wastes, buried drums, pipelines, reinforced building foundations, or other metal components of buried structures. It is, however, equally sensitive to metal objects on the ground surface, and it is important to take careful field notes that indicate the position of surface metal to avoid mis-interpretation.

A Geonics EM-61 high-resolution time domain metal detector, or equivalent, will be used to conduct the first phase of the investigation. The EM-61 is used to detect both ferrous and non-ferrous metals buried in the upper 10 feet of the subsurface. A powerful transmitter generates a pulsed primary magnetic field, which induces eddy currents in nearby metal objects. The decay of these currents is measured by upper and lower receiver coils mounted in the coil assembly. The responses are recorded and displayed by an integrated data logger as two-channel information. The bottom channel is more sensitive to metallic objects in the shallow (upper few feet) subsurface, and the differential response is more sensitive to metal objects from 3 to 10 feet below ground surface. The EM-61 can detect a single 55-gallon drum at a depth of more than 10 feet beneath the instrument, yet it is relatively insensitive to interference from nearby surface metal such as fencing,

buildings, and automobiles. The instrument is pulled along the ground surface by a single operator, and measurements are collected at desired intervals along the ground surface. The terrain at the site may limit the areas where the EM-61 survey can be completed.

Anomalies detected during the EM surveys will be marked on the ground and further investigated using ground penetrating radar (GPR).

#### 2.1.2 *Ground Penetrating Radar Survey*

A GPR survey will be performed in the area of LT where subsurface utilities / conduits are believed to be present to supplement the EM results in the event interferences exist that interfere with the EM scan. The GPR method is based upon the transmission of repetitive, radio-frequency EM pulses into the subsurface. When the transmitted energy of down-going wave contacts an interface of dissimilar electrical character, part of the energy is returned to the surface in the form of a reflected signal. This reflected signal is detected by a receiving transducer and is displayed on the screen of the GPR unit as well as being recorded on the internal hard-drive.

The received GPR response remains constant as long as the electrical contrast between media is present and constant. Lateral or vertical changes in the electrical properties of the subsurface result in equivalent changes in the GPR responses. The system records a continuous image of the subsurface by plotting two-way travel time of the reflected EM pulse versus distance traveled along the ground surface. Two-way travel time values are then converted to depth using known soil velocity functions. Each radar profile will be examined for characteristic GPR signatures that may indicate the presence of buried targets.

#### 2.1.3 *Geophysical Investigation Report*

A Geophysical Report will be prepared and included in the Investigation Report that documents the findings of the investigation. The results of the geophysical investigation will be reviewed against the site boundary to determine if the utilities in question are located on the LT Site or offsite which will determine how they need to be handled.

### 2.2 Subsurface Investigation

Supplemental subsurface soil sampling will be performed to characterize / confirm arsenic and lead concentrations in the areas of concern on the former LT Parcel C (Upper and Lower) and to further quantify arsenic and lead content in subsurface soils throughout the Site as shown on **Figures 1** through **4.** As shown on the attached figures, arsenic and / or lead were the only metals detected in excess of SWCLs on Parcel C

(Upper and Lower) with the exception of minor exceedances of copper, manganese and/or nickel at several locations. Therefore, PWGC believes that limiting this characterization sampling in the RFA's to arsenic and lead is appropriate as they are the main contaminants of concern and provide an overall indication of impact.

The sample locations were chosen to provide further information in the areas of concern on the former LT Parcel C and areas of the Site where arsenic and / or lead have been previously documented at concentrations in excess of SWCLs. The rationale for the selection of samples is discussed in Section 4.1. Sample locations will be relocated in the field using a global positioning system (GPS). Additional step-out borings may be performed in the areas of concern on the former LT Parcel C based upon the result of the initial sample locations.

### 2.2.1 *Soil Boring Protocol*

Before each soil boring is installed, a 10-mil polyethylene sheeting, sufficiently large to hold the anticipated number of soil cores will be laid on the ground in the area near the soil boring location.

Soil borings will be installed using a Geoprobe® direct-push drill rig outfitted with a dual-core sampler or closed piston sampler and dedicated acetate liners. Soil borings will be advanced continuously from surface grade to four feet below the groundwater interface. The entire soil column will be analyzed for total arsenic and lead in two-foot increments, alleviating the need for field screening.

### 2.2.2 *Sampling Protocol*

Each two-foot increment will be transferred to a stainless steel bowl, homogenized, and transferred to laboratory-supplied glassware. The sample bottles will be packed in a cooler with ice and shipped under proper chain-of-custody procedures to a NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory for analysis following NYSDEC Analytical Services Protocol (ASP) - Category B Deliverables for analysis of total arsenic and lead. Non-disposable sampling equipment will be decontaminated prior to and in-between sampling with a laboratory grade detergent, tap water rinse, and distilled water rinse.

## 3.0 QUALITY ASSURANCE PROJECT PLAN

This quality assurance project plan (QAPP) presents the objectives, functional activities, methods, and quality assurance / quality control (QA/QC) requirements associated with sample collection and laboratory analysis for characterization activities. The QAPP follows requirements detailed in the Division of Environmental Remediation's (DER) Technical Guidance for Site Investigation and Remediation (DER-10), Section 2.

### 3.1 Project Organization

The investigative efforts defined in this work plan will be coordinated by PWGC on behalf of RXR-Glen Isle Partners, LLC. The following identifies the responsibilities of various organizations supporting the investigation:

- The NYSDEC Project Manager (Heidi Dudek) with concurrence from the USEPA Project Manager (Ashley Similo) will be responsible for reviewing and approving this work plan, coordinating approval of requested modifications, and providing guidance on regulatory requirements.
- The PWGC Program Manager (James P. Rhodes, CPG) will provide technical expertise for review of the project plans, reports and ongoing field activities. The Program Manager will act as the project's QA Manager.
- PWGC Project Manager (Derek Ersbak) will be responsible for the day-to-day project management, task leadership, and project engineering support and for the planning and implementation of investigative activities. The Project Manager is responsible for ensuring that the requirements of this work plan are implemented. The project manager will also act as the Site Health and Safety Manager (HSM).
- PWGC Field Team Leader (Amanda Racaniello) will be responsible for sample collection, oversight of subcontractor personnel, and coordination of daily field activities. The Field Team Leader will act as the Site Health and Safety Officer ensuring implementation of the Site Health and Safety Plan (HASP).
- A NYSDOH ELAP certified laboratory (Test America Laboratories) will be contracted to perform required analyses and reporting, including ASP Category B Deliverables, which will allow for data validation.
- Subcontractors will perform surveying, drilling, and/or sampling at the direction of the Field Team Leader in accordance with this work plan.

### 3.2 Laboratory Analysis

Requirements for sample analysis are described below. All samples will be submitted to a NYSDOH ELAP certified laboratory (Test America Laboratories) for analysis. Analytical methods, preservation, container requirements, and holding times are summarized below:

ANALYTICAL METHODS

(SOIL)

| Sample Matrix | Sample Type | Parameters | USEPA Method | Sample Preservation | Holding Time | Sample Container |
|---|---|---|---|---|---|---|
| Soil | Composite | As/Pb | 6010 | Cool to 4°C | 6 months | 4 oz. wide mouth glass |
| Soil | Composite | As/Pb | 1312 | Cool to 4°C | 6 months | 4 oz. wide mouth glass |

### 3.3 Field/Laboratory Data Control Requirements

QC procedures will be followed in the field and at the laboratory to facilitate that reliable data are obtained. When performing field sampling, care shall be taken to prevent the cross-contamination of sampling equipment, sample bottles, and other equipment that could compromise sample integrity. QC samples will include blind duplicates, equipment blanks, trip blanks, method blanks, matrix spike and matrix spike duplicates.

### 3.4 Chain-of-Custody, Sample Packaging and Shipment

Each day that samples are collected, a chain-of-custody/request for analysis form will be completed and submitted to the laboratory with samples to be analyzed. A copy of the chain-of-custody will be retained by the Project Manager. The chain-of-custody will include the project name, sampler's signature, sample IDs, date and time of sample collection, and analysis requested.

Samples will be packaged and shipped in a manner that maintains sample preservation requirements during transport (i.e., ice to keep samples cool until receipt at the laboratory), ensures that sample holding times can be achieved by the laboratory, and prevents samples from being tampered with.

If a commercial carrier ships samples, a bill of lading (waybill) will be used as documentation of sample custody. Receipts for bills of lading and other documentation of shipment shall be maintained as part of the permanent custody documentation. Commercial carriers are not required to sign the chain-of-custody as long as it is enclosed in the shipping container and evidence tape (custody seal) remains in place on the shipping container.

## 3.5 Data Usability and Validation

The main purpose of the data is for use in further delineating the extent of contamination at the site and to support establishment of a Soil Management Level. Based upon this, data usability and validation will be performed as described below. Complete data packages will be archived in the project files, and if deemed necessary additional validation can be performed using procedures in the following sections.

### 3.5.1 *Data Usability and Validation Requirements*

Data usability and validation are performed on analytical data sets, primarily to confirm that sampling and chain-of-custody documentation are complete, sample IDs can be tied to specific sampling locations, samples were analyzed within the required holding times, and analyses are reported in conformance with NYSDEC ASP, Category B data deliverable requirements as applicable to the method use.

### 3.5.2 *Data Usability and Validation Methods*

A designee of the PWGC Project Manager will complete a data usability evaluation for the data collected during the investigation and a data usability summary report (DUSR) will be prepared. The DUSR will be prepared in accordance with NYSDEC DER-10, Appendix 2B.

Independent third party data validation will be performed on 5% of the sample data, or on one sample from each sample delivery group (SDG), whichever is greater. Data validation will be performed by a qualified subcontractor (Laboratory Data Consultants, Inc.) independent of the project.

## 3.6 Field Equipment Calibration

Equipment will be inspected and approved by the Field Team Leader before being used. Equipment will be calibrated to factory specifications, if required. Monitoring equipment will be calibrated following manufacturers recommended schedules. Daily field response checks and calibrations will be performed as necessary (i.e. PID calibrations) following manufacturers standard operating procedures. Equipment calibrations will be documented in a designated field logbook.

Equipment for this investigation will include a photoionization detector and dust meter for use during community air monitoring.

## 3.7 Equipment Decontamination

In order to minimize the potential for cross-contamination, non-dedicated drilling and sampling equipment shall be properly decontaminated prior to and between sampling/drilling locations.

### 3.7.1 *General Procedures*

Drilling equipment will be decontaminated in a designated area. Sampling equipment and probes will be decontaminated in an area covered with plastic sheeting near the sampling location. Waste material generated during decontamination activities will be containerized, stored and disposed of in accordance with the procedures detailed in Section 3.7. Decontamination of sampling equipment shall be kept to a minimum, and wherever possible, dedicated sampling equipment shall be used. Personnel directly involved in equipment decontamination shall wear appropriate personal protective equipment (PPE).

### 3.7.2 *Drilling Equipment*

Drilling equipment shall be decontaminated prior to performance of the first boring and between all subsequent borings. This shall include hand tools, casing, augers, drill rods, temporary well material and other related tools and equipment. Water used during drilling and/or steam cleaning operations shall be from a potable source.

### 3.7.3 *Sampling Equipment*

Sampling equipment (i.e., trowels, knives, bowls, etc...) will be decontaminated prior to each use as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
- Generous tap water rinse
- Distilled water rinse

## 3.8 Management of Investigation Derived Waste

Waste materials generated from the field operations may consist of soil cuttings, purge water, and miscellaneous solid materials such as PPE and supplies. Investigative derived waste (IDW) generated during field operations will be disposed of in accordance with applicable regulations.

Soil cuttings generated from soil boring activities will be stored in 55-gallon drums. Drums will be labeled to indicate the source of the soil and will be stored in a designated area onsite. Drummed soils will be disposed

of at an off-site disposal facility. Following receipt of the analytical results, recommendations for disposition of the drummed soil will be provided to the NYSDEC.

### 3.9 Field Documentation

Documentation will take place on either appropriate forms or in a dedicated site logbook. Permanent black or blue ink will be used to record information in the logbook. Errors in field documentation will be lined through, initialed, dated, and corrected. Forms will be kept by the PWGC Field Team Leader during the field activities. Field activities will be documented in the field logbook. The logbook will contain waterproof pages that are consecutively numbered, and be permanently bound with a hard cover. Upon completion of daily activities, unused portions of pages will be lined-through and initialed.

The primary purpose of the field logbook is to document the daily field activities and to provide descriptions of each activity. All entries in the field logbook will be recorded and dated by person making the entry.

## 4.0 DATA EVALUATION

In order to determine the levels of arsenic and lead that may remain in place under ECs that are protective of the Class GA GQS, evaluations will be performed on the former CC Site and LT Site separately. The soil characteristics are slightly different for the CC Site due to the landfill operations on the site which may affect the SPLP evaluation.

### 4.1 Population Size Selection

#### 4.1.1 *Li Tungsten Site*

The former LT Site (specific to Parcel A and Parcel Lower C) encompasses approximately 9 acres. In general, soils were characterized as medium to fine sands with silt and trace gravel overlain by clay and bog layers. Construction related debris (brick, concrete, cobble, wood) were detected throughout the site. Saturated soils indicating the groundwater table was encountered between 2 feet below ground surface (bgs) near the bulkhead and increased towards the north to 8 feet bgs.

Remedial confirmation sampling and post remedial confirmation sampling performed to date has included 53 post remedial endpoint soil samples and samples from 51 test pits and 87 soil borings throughout the site (total of 191 locations). At each of these locations soil samples were analyzed from one or more depth intervals. Arsenic and / or lead were detected above SWCLs at 50 of the confirmation sampling locations.

For this investigation, seventeen of the 50 confirmation sample locations where SWCLs were exceeded are proposed for the population size. In addition, five additional soil borings are proposed to further characterize the RFA's. As soils will be analyzed at two-foot intervals continuously to four feet below the groundwater interface, the overall population size will range between 66 to 132 samples. This range is based upon the anticipated depth to groundwater. The samples locations were biased towards locations with the highest arsenic and / or lead concentrations. Samples locations previously analyzed for SPLP were not selected for this analysis.

#### 4.1.2 *Captain's Cove Site*

The former CC Site encompasses approximately 23 acres, including an estimated 4 acres of tidal wetlands along the Site's southern boundary bordering Glen Cove Creek. In general, soils have been characterized as medium to fine sands with silt and trace gravel overlain by clay and bog layers. Construction related debris (brick, concrete, cobble, wood) have been detected throughout the site. Saturated soils indicating the

groundwater table have been documented between 4 feet bgs near the bulkhead and increased towards the north to 10 feet bgs.

Post remedial confirmation sampling performed to date has included twelve test pits and 63 soil borings throughout the site (total of 75 locations). At each of these locations soil samples were analyzed from one or more depth intervals. Arsenic and/or lead were detected above the NYSDEC Source Material Definition at 26 of the post-remedial confirmation sampling locations.

For this investigation, eleven of the 26 post remedial confirmation sample locations where the NYSDEC Source Material Definition was exceeded are proposed for the population size. Since soil will be analyzed at two foot intervals continuously to four feet below the groundwater interface, the overall population size will range between 44 to 77 samples. This range is based upon the anticipated depth to groundwater. The samples locations were biased towards locations with the highest arsenic and/or lead concentrations. Samples locations previously analyzed for SPLP were not selected for this analysis.

### 4.2 Sample Size Selection

A sub-set of the total soil concentration samples collected will be analyzed for SPLP concentrations. The quantity of sub-set samples that will be tested using the SPLP Method will be selected using a standard statistical approach. The statistical approach will entail the following methodology:

> Sample size (n) selection will be based on the population size (N) and corresponding data and statistical values for the data set. A minimum confidence level (C) of 95% will be used. The sample population mean ($\mu$) and standard deviation ($\sigma$) will be calculated and used to determine a sample size with an acceptable confidence interval (margin of error). A normal distribution will be assumed unless the data prove otherwise.

Once the number of SPLP samples (n) is identified the samples will be selected based on the range of total soil concentration values observed. The population range will be divided by the number of samples to generate categories of sub-ranges and a sample will attempted to be selected in each sub-range. For instance, if say 10 samples are required to be selected and the population range is from 0 to 1,000 mg/kg then a sample would be selected from each range of 100 mg/kg groupings (0-100 mg/kg, 101-200 mg/g, 201-300 mg/g, etc….). If data gaps exist, say there are no samples in the 501-600 mg/kg sub-range category then the sample would be collected from the next closest range with a sample value within it (i.e., either 401-500 mg/kg or 601-700 mg/kg). The selected samples proposed for SPLP testing will be summarized and presented to the regulatory

agencies for discussion. Upon completion of the discussion, the selected samples will then be submitted for laboratory analysis for SPLP concentrations.

### 4.3 Linear Regression Analysis to Establish a Site Specific Soil Management Level

After the samples selected for SPLP analysis are analyzed and the results are received, a linear regression method will be used to determine a site specific Soil Management Level for arsenic and lead. The sample set will be plotted with the horizontal axis representing total soil concentrations in mg/kg and the vertical axis of the plot representing SPLP concentrations in µg/l. A linear regression analysis will be conducted using the method of least squares to best fit a straight line through the data plot. Criteria will be reviewed to determine if the plotted data qualify for a linear correlation, which will include at least half the plotted data points must have a total soil concentration value above the midpoint of the range and the $R^2$ value for the linear least squares regression analysis must be higher than 0.70. If the plotted data meet the linear correlation test criteria the value of x-axis or horizontal axis intercept of the straight line fitted through the data plot will then be the recommended site specific Soil Action Level for arsenic and lead.

### 4.4 Investigation Report Preparation

The Investigation Report will incorporate the methods and findings of the investigation activities performed as outlined in this work plan. The report will characterize/confirm the concentrations of contamination in RFA's and provide conclusions and recommendations for development of the site specific Soil Management Level that is protective of Class GA GQS. Electronic copies of the Investigation Report will be submitted to the regulatory agencies. Analytical results of the investigation will be submitted in the electronic data delivery (EDD) format through the Department's environmental information management system (EIMS).

## 5.0 HEALTH AND SAFETY

Field operations will be performed in accordance with the health and safety requirements provided in the site specific HASP prepared by Posillico Environmental (October 2012). The HASP is included as **Appendix B**. The HASP outlines the requirements for training, medical surveillance, daily tailgate meetings, emergency response, and accident and injury reporting. The HASP will be followed with the following modifications:

- Section 6.2 Personal Air Monitoring
    - Personal Air Monitoring will not be performed during the investigation due to the nature of the investigation and minimal disturbance to the soils at the site.

## 6.0 COMMUNITY AIR MONITORING PLAN

This Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in excavation work) from potential airborne contaminant releases resulting from drilling activities. Action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the work did not spread contamination off-site through the air.

The primary air monitoring concerns for this site are volatile organic vapors and dust particulates.

### 6.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- 29 CFR 1910.120(h): This regulation specifies that air shall be monitored to identify and quantify levels of airborne hazardous substances and health hazards, and to determine the appropriate level of protection for workers.
- NYSDOH Generic Community Air Monitoring Plan: This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air.
- NYSDEC Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

### 6.2 Air Monitoring

The following sections contain information describing the types, frequency and location of real-time monitoring.

#### 6.2.1 *Real-Time Monitoring*

This section addresses the real-time monitoring conducted within the work area, and along the work perimeter, during intrusive activities.

##### *6.2.1.1 Work Area*

The following instruments shall be used for work area monitoring:

- PID
- Dust Monitor

Table 2-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 2-2 lists the Real-Time Air Monitoring Action Levels to be used in work areas.

#### *6.2.1.1 Community Air Monitoring Requirements*

To establish ambient air background concentrations, air quality monitoring shall be performed at several locations around the perimeter of the excavation before activities begin. Air monitoring shall be continued periodically in series during work activities.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor or equivalent. Air will be monitored for volatile organic vapors with a portable Photovac MicroTip photoionization detector (PID), or equivalent. Table 2-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 2-2 lists the Real-Time Air Monitoring Action Levels to be used in work areas. Air monitoring data shall be documented in a site log book by the designated site safety officer. The site safety officer or delegate shall calibrate and maintain air monitoring instruments in accordance with manufacturer's specifications. Instruments shall be zeroed daily and checked for accuracy and a daily log shall be kept. If additional air monitoring is required, protocols shall be appended to this plan.

TABLE 2-1

FREQUENCY AND LOCATION OF AIR MONITORING

| ACTIVITY | AIR MONITORING INSTRUMENT | FREQUENCY AND LOCATION |
|---|---|---|
| Drilling | PID, Dust Monitor | Continuous in Breathing Zone (BZ) and downwind work area perimeter during intrusive activities or if odors become apparent. Screening upon arrival at excavation locations, screening in the BZ during excavation and downwind work area perimeter every 30 minutes during non-intrusive activities |

TABLE 2-2

REAL TIME AIR MONITORING ACTION LEVELS

| AIR MONITORING INSTRUMENT | MONITORING LOCATION | ACTION LEVEL | SITE ACTION | REASON |
|---|---|---|---|---|
| PID | Breathing Zone | 0-25 ppm, non-transient | None | Exposure below established exposure limits |
| PID | Breathing Zone | 25-100 ppm, non-transient | Don Air-Purifying Respirator (APR) | Based on potential exposure to volatile organic vapor |
| PID | Breathing Zone | >100 ppm, non-transient | Don Air-Supplied Respirator (ASR) or Self-Contained Breathing Apparatus (SCBA), Institute vapor/odor suppression measures, Notify HSM. | Increased exposure to site contaminants, potential for vapor release to public areas. |
| PID | Work Area Perimeter | < 5 ppm | None | Exposure below established exposure limits. |
| PID | Work Area Perimeter | > 5 ppm | Stop work and implement vapor release response plan until readings return to acceptable levels, Notify HSM. | Increased exposure to site contaminants, potential for vapor release to public areas |
| Aerosol Monitor | Work Area Perimeter | >100 but < 150 $\mu g/m^3$ for 15 minutes | Institute dust suppression measures, Notify HSM. | Work to continue if particulate concentrations remain below 150 $\mu g/m^3$ |
| Aerosol Monitor | Work Area Perimeter | >150 $\mu g/m^3$ | Don ASR or SCBA, Institute dust suppression measures, Notify HSM. | Stop work until readings return to acceptable levels, |

### 6.3 Vapor Emission Response Plan

This section is excerpted from the NYSDOH guidance for CAMP - Ground Intrusive Activities.

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities shall be halted and monitoring continued. Vapor suppression measures can also be taken at this time. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- Organic vapor levels 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If organic vapor levels exceed 25 ppm at the perimeter of the work area, work activities shall be halted. When work is halted, downwind air monitoring as directed by the Site Health & Safety Officer shall be implemented to determine whether vapor emission may impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan Section.

### 6.4 Major Vapor Emission Response Plan

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

If, following the cessation of the work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality shall be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

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

However, the Major Vapor Emission Response Plan shall be immediately placed in effect if organic vapor levels are greater than 10 ppm above background.

Upon activation, the following activities shall be undertaken:

1. Emergency Response Contacts, as identified in the HASP, shall go into effect.
2. The local police authorities shall be contacted immediately by the Health & Safety Officer and advised of the situation.
3. Frequent air monitoring shall be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Health & Safety Officer.

## 6.5 Data Quality Assurance

### 6.5.1 *Calibration*

Instrument calibration shall be documented in the designated field logbook. Instruments shall be calibrated before each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

### 6.5.2 *Operations*

Instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment shall be maintained on-site by the Field Operations Leader/Health & Safety Officer for reference.

### 6.5.3 *Data Review*

The Field Team Leader shall interpret monitoring data based on Table 2-2 and his/her professional judgment. The Field Team Leader shall review the data with the HSM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with sample documentation shall be periodically reviewed by the HSM.

## 6.6 Records and Reporting

Readings shall be recorded and available for review by personnel from NYSDEC and NYSDOH. Should any of the action levels be exceeded, the NYSDEC Division of Air Resources shall be notified in writing within five (5) working days.

The notification shall include a description of the control measures implemented to prevent further exceedances.

## 7.0 REFERENCES

*Environmental Chemical Corporation, Final Final Status Survey Report; August2009.*

*Gannett Fleming Engineers, P.C., Draft Contaminated Materials Assessment Report; January 2015.*

*Metron Development Services, Glen Isle Field Verification Program Certification Sampling Event #1; May 2004.*

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

*NYSDEC, Division of Water, Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations; June 1998, Addendum April 2000.*

*PWGC, Leachable Arsenic and Lead Sampling Report – Garvies' Point Redevelopment Project; February 2015.*

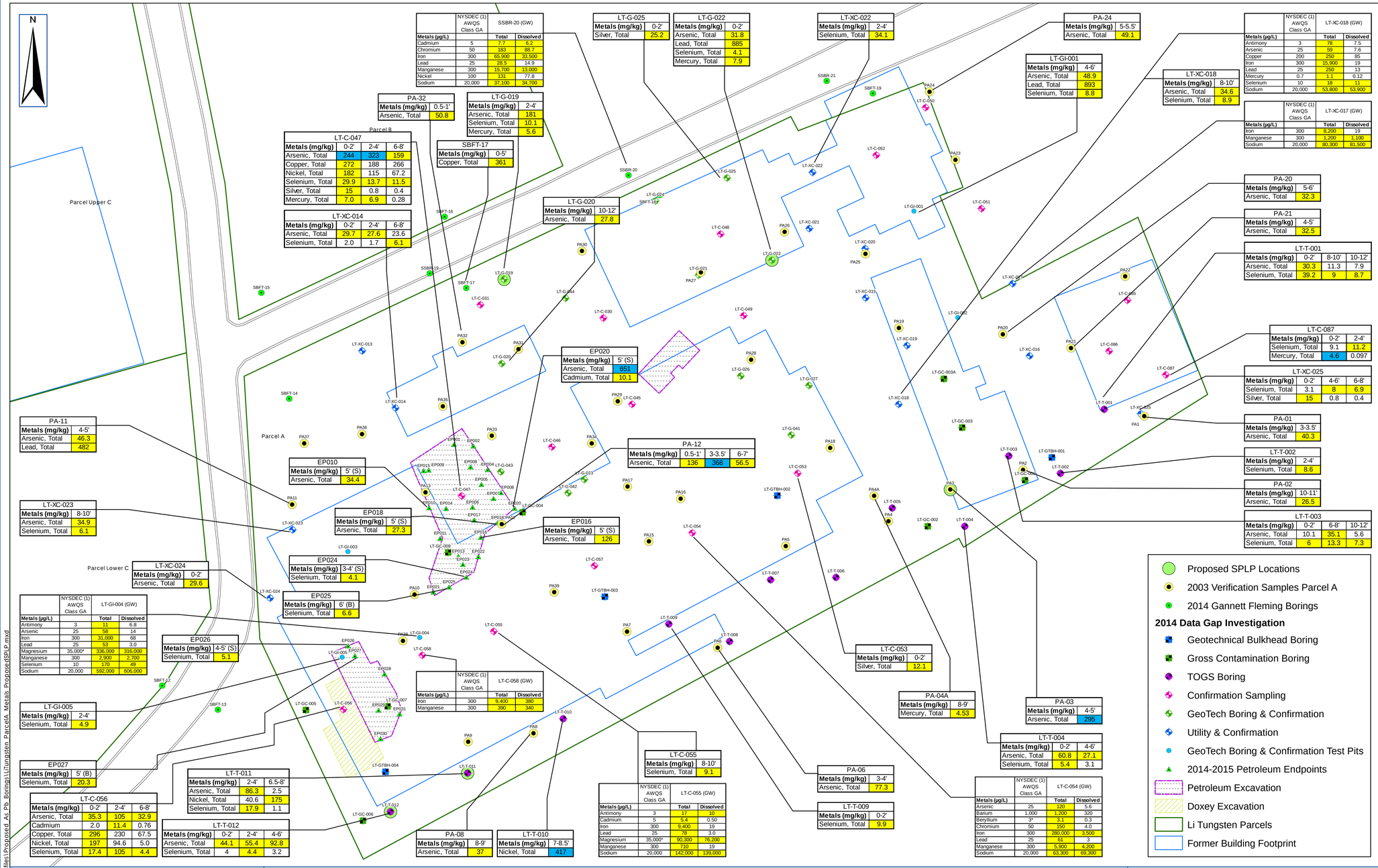
*PWGC, Pre-Construction Confirmatory/Insurance Data Gap Subsurface Investigation Report; May 2014.*

*PWGC, Summary of Visual Petroleum Stained Soil Investigation and Remediation – Li Tungsten Site; March 2015.*

*PWGC, Supplemental Soil Testing – Former Li Tungsten Site – Lounge and Benbow Buildings; March 2015.*

*USEPA, Remedial Action Report for Operable Unit 1 (Li Tungsten Facility); September2008.*

**FIGURES**




| | NYSDEC (1) AWQS Class GA | SSBR-20 (GW) | |
|---|---|---|---|
| Metals (µg/L) | | Total | Dissolved |
| Cadmium | 5 | 7.7 | 6.2 |
| Chromium | 50 | 183 | 88.7 |
| Iron | 300 | 65,900 | 33,500 |
| Lead | 25 | 28.5 | 14.9 |
| Manganese | 300 | 15,700 | 13,000 |
| Nickel | 100 | 131 | 77.8 |
| Sodium | 20,000 | 37,100 | 34,700 |

| LT-G-025 | |
|---|---|
| Metals (mg/kg) | 0-2' |
| Silver, Total | 25.2 |

| LT-G-022 | |
|---|---|
| Metals (mg/kg) | 0-2' |
| Arsenic, Total | 31.8 |
| Lead, Total | 885 |
| Selenium, Total | 4.1 |
| Mercury, Total | 7.9 |

| LT-XC-022 | |
|---|---|
| Metals (mg/kg) | 2-4' |
| Selenium, Total | 34.1 |

| PA-24 | |
|---|---|
| Metals (mg/kg) | 5-5.5' |
| Arsenic, Total | 49.1 |

| LT-GI-001 | |
|---|---|
| Metals (mg/kg) | 4-6' |
| Arsenic, Total | 48.9 |
| Lead, Total | 893 |
| Selenium, Total | 8.8 |

| | NYSDEC (1) AWQS Class GA | LT-XC-018 (GW) | |
|---|---|---|---|
| Metals (µg/L) | | Total | Dissolved |
| Antimony | 3 | 78 | 7.5 |
| Arsenic | 25 | 59 | 7.6 |
| Copper | 200 | 250 | 85 |
| Iron | 300 | 15,900 | 19 |
| Lead | 25 | 250 | 13 |
| Mercury | 0.7 | 1.1 | 0.12 |
| Selenium | 10 | 18 | 11 |
| Sodium | 20,000 | 53,800 | 53,900 |

| LT-XC-018 | |
|---|---|
| Metals (mg/kg) | 8-10' |
| Arsenic, Total | 34.6 |
| Selenium, Total | 8.9 |

| | NYSDEC (1) AWQS Class GA | LT-XC-017 (GW) | |
|---|---|---|---|
| Metals (µg/L) | | Total | Dissolved |
| Iron | 300 | 8,200 | 19 |
| Manganese | 300 | 1,200 | 1,100 |
| Sodium | 20,000 | 80,300 | 81,500 |

| PA-32 | |
|---|---|
| Metals (mg/kg) | 0.5-1' |
| Arsenic, Total | 50.8 |

| LT-G-019 | |
|---|---|
| Metals (mg/kg) | 2-4' |
| Arsenic, Total | 181 |
| Selenium, Total | 10.1 |
| Mercury, Total | 5.6 |

| SBFT-17 | |
|---|---|
| Metals (mg/kg) | 0-5' |
| Copper, Total | 361 |

| LT-C-047 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0-2' | 2-4' | 6-8' |
| Arsenic, Total | 244 | 323 | 159 |
| Copper, Total | 272 | 188 | 266 |
| Nickel, Total | 182 | 115 | 67.2 |
| Selenium, Total | 29.9 | 13.7 | 11.5 |
| Silver, Total | 15 | 0.8 | 0.4 |
| Mercury, Total | 7.0 | 6.9 | 0.28 |

| LT-XC-014 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0-2' | 2-4' | 6-8' |
| Arsenic, Total | 29.7 | 27.6 | 23.6 |
| Selenium, Total | 2.0 | 1.7 | 6.1 |

| LT-G-020 | |
|---|---|
| Metals (mg/kg) | 10-12' |
| Arsenic, Total | 27.8 |

| PA-20 | |
|---|---|
| Metals (mg/kg) | 5-6' |
| Arsenic, Total | 32.3 |

| PA-21 | |
|---|---|
| Metals (mg/kg) | 4-5' |
| Arsenic, Total | 32.5 |

| LT-T-001 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0-2' | 8-10' | 10-12' |
| Arsenic, Total | 30.3 | 11.3 | 7.9 |
| Selenium, Total | 39.2 | 9 | 8.7 |

| LT-C-087 | | |
|---|---|---|
| Metals (mg/kg) | 0-2' | 2-4' |
| Selenium, Total | 9.1 | 11.2 |
| Mercury, Total | 4.6 | 0.097 |

| LT-XC-025 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0-2' | 4-6' | 6-8' |
| Selenium, Total | 3.1 | 8 | 6.9 |
| Silver, Total | 15 | 0.8 | 0.4 |

| EP020 | |
|---|---|
| Metals (mg/kg) | 5' (S) |
| Arsenic, Total | 651 |
| Cadmium, Total | 10.1 |

| PA-11 | |
|---|---|
| Metals (mg/kg) | 4-5' |
| Arsenic, Total | 46.3 |
| Lead, Total | 482 |

| EP010 | |
|---|---|
| Metals (mg/kg) | 5' (S) |
| Arsenic, Total | 34.4 |

| PA-12 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0.5-1' | 3-3.5' | 6-7' |
| Arsenic, Total | 136 | 368 | 56.5 |

| PA-01 | |
|---|---|
| Metals (mg/kg) | 3-3.5' |
| Arsenic, Total | 40.3 |

| LT-T-002 | |
|---|---|
| Metals (mg/kg) | 2-4' |
| Selenium, Total | 8.6 |

| PA-02 | |
|---|---|
| Metals (mg/kg) | 10-11' |
| Arsenic, Total | 26.5 |

| LT-XC-023 | |
|---|---|
| Metals (mg/kg) | 8-10' |
| Arsenic, Total | 34.9 |
| Selenium, Total | 6.1 |

| EP018 | |
|---|---|
| Metals (mg/kg) | 5' (S) |
| Arsenic, Total | 27.3 |

| EP016 | |
|---|---|
| Metals (mg/kg) | 5' (S) |
| Arsenic, Total | 126 |

| LT-T-003 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0-2' | 6-8' | 10-12' |
| Arsenic, Total | 10.1 | 35.1 | 5.6 |
| Selenium, Total | 6 | 13.3 | 7.3 |

| EP024 | |
|---|---|
| Metals (mg/kg) | 3-4' (S) |
| Selenium, Total | 4.1 |

| LT-XC-024 | |
|---|---|
| Metals (mg/kg) | 0-2' |
| Arsenic, Total | 29.6 |

| EP025 | |
|---|---|
| Metals (mg/kg) | 6' (B) |
| Selenium, Total | 6.6 |

| | NYSDEC (1) AWQS Class GA | LT-GI-004 (GW) | |
|---|---|---|---|
| Metals (µg/L) | | Total | Dissolved |
| Antimony | 3 | 11 | 6.8 |
| Arsenic | 25 | 58 | 14 |
| Iron | 300 | 31,000 | 68 |
| Lead | 25 | 53 | 3.0 |
| Magnesium | 35,000* | 336,000 | 316,000 |
| Manganese | 300 | 2,900 | 2,700 |
| Selenium | 10 | 170 | 49 |
| Sodium | 20,000 | 592,000 | 606,000 |

| EP026 | |
|---|---|
| Metals (mg/kg) | 4-5' (S) |
| Selenium, Total | 5.1 |

| | NYSDEC (1) AWQS Class GA | LT-C-058 (GW) | |
|---|---|---|---|
| Metals (µg/L) | | Total | Dissolved |
| Iron | 300 | 9,400 | 380 |
| Manganese | 300 | 390 | 340 |

| LT-C-053 | |
|---|---|
| Metals (mg/kg) | 0-2' |
| Silver, Total | 12.1 |

| PA-04A | |
|---|---|
| Metals (mg/kg) | 8-9' |
| Mercury, Total | 4.53 |

| PA-03 | |
|---|---|
| Metals (mg/kg) | 4-5' |
| Arsenic, Total | 295 |

| LT-GI-005 | |
|---|---|
| Metals (mg/kg) | 2-4' |
| Selenium, Total | 4.9 |

| LT-T-004 | | |
|---|---|---|
| Metals (mg/kg) | 0-2' | 4-6' |
| Arsenic, Total | 60.8 | 27.1 |
| Selenium, Total | 5.4 | 3.1 |

| LT-C-055 | |
|---|---|
| Metals (mg/kg) | 8-10' |
| Selenium, Total | 9.1 |

| EP027 | |
|---|---|
| Metals (mg/kg) | 5' (B) |
| Selenium, Total | 20.3 |

| LT-T-011 | | |
|---|---|---|
| Metals (mg/kg) | 2-4' | 6.5-8' |
| Arsenic, Total | 86.3 | 2.5 |
| Nickel, Total | 40.6 | 175 |
| Selenium, Total | 17.9 | 1.1 |

| | NYSDEC (1) AWQS Class GA | LT-C-055 (GW) | |
|---|---|---|---|
| Metals (µg/L) | | Total | Dissolved |
| Antimony | 3 | 17 | 10 |
| Cadmium | 5 | 5.4 | 0.50 |
| Iron | 300 | 9,400 | 19 |
| Lead | 25 | 78 | 3.0 |
| Magnesium | 35,000* | 90,300 | 76,200 |
| Manganese | 300 | 710 | 19 |
| Sodium | 20,000 | 142,000 | 139,000 |

| PA-06 | |
|---|---|
| Metals (mg/kg) | 3-4' |
| Arsenic, Total | 77.3 |

| LT-T-009 | |
|---|---|
| Metals (mg/kg) | 0-2' |
| Selenium, Total | 9.9 |

| | NYSDEC (1) AWQS Class GA | LT-C-054 (GW) | |
|---|---|---|---|
| Metals (µg/L) | | Total | Dissolved |
| Arsenic | 25 | 120 | 5.6 |
| Barium | 1,000 | 1,200 | 320 |
| Beryllium | 3* | 3.1 | 0.3 |
| Chromium | 50 | 150 | 4.0 |
| Iron | 300 | 280,000 | 3,500 |
| Lead | 25 | 61 | 3 |
| Manganese | 300 | 5,900 | 4,200 |
| Sodium | 20,000 | 63,300 | 69,300 |

| LT-XC-056 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0-2' | 2-4' | 6-8' |
| Arsenic, Total | 35.3 | 105 | 32.9 |
| Cadmium | 2.0 | 11.4 | 0.78 |
| Copper, Total | 296 | 230 | 67.5 |
| Nickel, Total | 197 | 94.6 | 5.0 |
| Selenium, Total | 17.4 | 105 | 4.4 |

| LT-T-012 | | | |
|---|---|---|---|
| Metals (mg/kg) | 0-2' | 2-4' | 4-6' |
| Arsenic, Total | 44.1 | 55.4 | 92.8 |
| Selenium, Total | 4 | 4.4 | 3.2 |

| PA-08 | |
|---|---|
| Metals (mg/kg) | 8-9' |
| Arsenic, Total | 37 |

| LT-T-010 | |
|---|---|
| Metals (mg/kg) | 7-8.5' |
| Nickel, Total | 417 |

- Proposed SPLP Locations
- 2003 Verification Samples Parcel A
- 2014 Gannett Fleming Borings

**2014 Data Gap Investigation**

- Geotechnical Bulkhead Boring
- Gross Contamination Boring
- TOGS Boring
- Confirmation Sampling
- GeoTech Boring & Confirmation
- Utility & Confirmation
- GeoTech Boring & Confirmation Test Pits
- 2014-2015 Petroleum Endpoints
- Petroleum Excavation
- Doxey Excavation
- Li Tungsten Parcels
- Former Building Footprint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Sampling Dates:

- 2014 Data Gap Samples collected from 1/13/2014 to 10/24/2014
- 2003 Verification Samples collected from 10/30/2003 to 11/11/2003
- Petroleum Endpoints collected from 10/1/2014 to 2/23/2015
- Gannett Fleming Samples collected from 10/6/2014 to 11/19/2014


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DRAWING PREPARED FOR:

DRAFT, FOR DISCUSSION PURPOSES ONLY

| REVISION | DATE | INITIAL | COMMENTS |
|---|---|---|---|

DRAWING INFORMATION:

| | | | |
|---|---|---|---|
| Project: | RGI1503 | Designed by: | DE |
| Date: | 3/31/2015 | Drawn by: | JCG |
| Scale: | AS SHOWN | Approved by: | DE |

FIGURE NO: 1

SHEET:

| Standards | NYSDEC CUSCOs | NYSDEC POGWSCO | NYSDEC Source Definition | SPLP Action Level |
|---|---|---|---|---|
| Metals (mg/kg) | | | | |
| Arsenic, Total | 16 | 16 | 24 | 200* |
| Copper, Total | 270 | 1,720 | 270 | - |
| Cadmium | 9.3 | 7.5 | 9.3 | - |
| Nickel, Total | 310 | 130 | 130 | - |
| Selenium, Total | 1,500 | 4 | 4 | - |
| Silver, Total | 1,500 | 8.3 | 8.3 | - |
| Mercury, Total | 2.8 | 0.73 | 2.8 | - |
| Lead, Total | 1,000 | 450 | 450 | 1,000* |

# LI TUNGSTEN - PARCEL A METALS

## GLEN ISLE

0 125 250 375 500 Feet

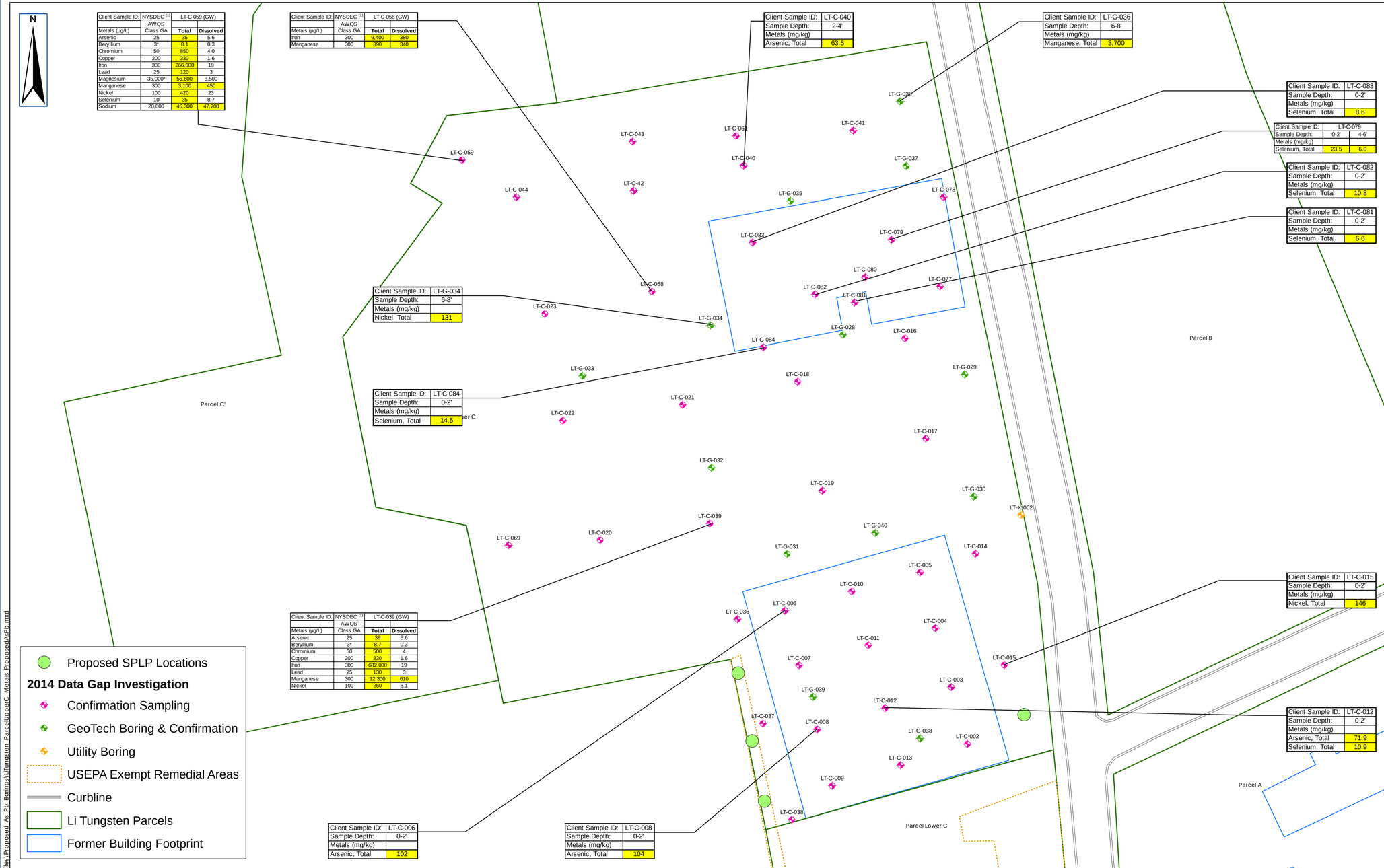
**Soil**

- Exceeds NYSDEC Source Definition
- Exceeds Anticipated SPLP Definition

**Groundwater**

- Exceeds NYSDEC Class GA AWQS

Document Path: Z:\Projects\M-R\RGI1503\mapfiles\Proposed As, Pb Borings\LiTungsten ParcelA_Metals_ProposedSPLP.mxd




| Client Sample ID: | NYSDEC [1] AWQS | LT-C-059 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Arsenic | 25 | 35 | 5.6 |
| Beryllium | 3* | 8.1 | 0.3 |
| Chromium | 50 | 850 | 4.0 |
| Copper | 200 | 330 | 1.6 |
| Iron | 300 | 266,000 | 19 |
| Lead | 25 | 120 | 3 |
| Magnesium | 35,000* | 56,600 | 8,500 |
| Manganese | 300 | 3,100 | 450 |
| Nickel | 100 | 420 | 23 |
| Selenium | 10 | 35 | 8.7 |
| Sodium | 20,000 | 45,300 | 47,200 |

| Client Sample ID: | NYSDEC [1] AWQS | LT-C-058 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Iron | 300 | 9,400 | 380 |
| Manganese | 300 | 390 | 340 |

| Client Sample ID: | LT-C-040 |
|---|---|
| Sample Depth: | 2-4' |
| Metals (mg/kg) | |
| Arsenic, Total | 63.5 |

| Client Sample ID: | LT-G-036 |
|---|---|
| Sample Depth: | 6-8' |
| Metals (mg/kg) | |
| Manganese, Total | 3,700 |

| Client Sample ID: | LT-C-083 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Selenium, Total | 8.6 |

| Client Sample ID: | LT-C-079 | |
|---|---|---|
| Sample Depth: | 0-2' | 4-6' |
| Metals (mg/kg) | | |
| Selenium, Total | 23.5 | 6.0 |

| Client Sample ID: | LT-C-082 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Selenium, Total | 10.8 |

| Client Sample ID: | LT-C-081 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Selenium, Total | 6.6 |

| Client Sample ID: | LT-G-034 |
|---|---|
| Sample Depth: | 6-8' |
| Metals (mg/kg) | |
| Nickel, Total | 131 |

| Client Sample ID: | LT-C-084 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Selenium, Total | 14.5 |

| Client Sample ID: | NYSDEC [1] AWQS | LT-C-039 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Arsenic | 25 | 39 | 5.6 |
| Beryllium | 3* | 8.7 | 0.3 |
| Chromium | 50 | 500 | 4 |
| Copper | 200 | 320 | 1.6 |
| Iron | 300 | 682,000 | 19 |
| Lead | 25 | 130 | 3 |
| Manganese | 300 | 12,300 | 610 |
| Nickel | 100 | 260 | 8.1 |

| Client Sample ID: | LT-C-015 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Nickel, Total | 146 |

| Client Sample ID: | LT-C-012 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Arsenic, Total | 71.9 |
| Selenium, Total | 10.9 |

| Client Sample ID: | LT-C-006 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Arsenic, Total | 102 |

| Client Sample ID: | LT-C-008 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Arsenic, Total | 104 |

| Standards | NYSDEC CUSCOs | NYSDEC POGWSCO | NYSDEC Source Definition | SPLP Action Level |
|---|---|---|---|---|
| Metals (mg/kg) | | | | |
| Arsenic, Total | 16 | 16 | 24 | 200* |
| Selenium, Total | 1,500 | 4 | 4 | - |
| Manganese, Tot | 10,000 | 2,000 | 2,000 | - |
| Nickel, Total | 310 | 130 | 130 | - |

# LI TUNGSTEN - PARCEL UPPER C
# METALS
## GLEN ISLE

0 100 200 300 400 Feet

**Soil**

- Exceeds NYSDEC Source Definition
- Exceeds Anticipated SPLP Definition

**Groundwater**

- Exceeds NYSDEC Class GA AWQS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E-mail: INFO@PWGROSSER.COM


Sampling Dates:

- 2014 Data Gap Samples collected from 1/13/2014 to 10/24/2014
- 2003 Verification Samples collected from 10/30/2003 to 11/11/2003
- Petroleum Endpoints collected from 10/1/2014 to 2/23/2015
- Gannett Fleming Samples collected from 10/6/2014 to 11/19/2014


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| REVISION | DATE | INITIAL | COMMENTS |
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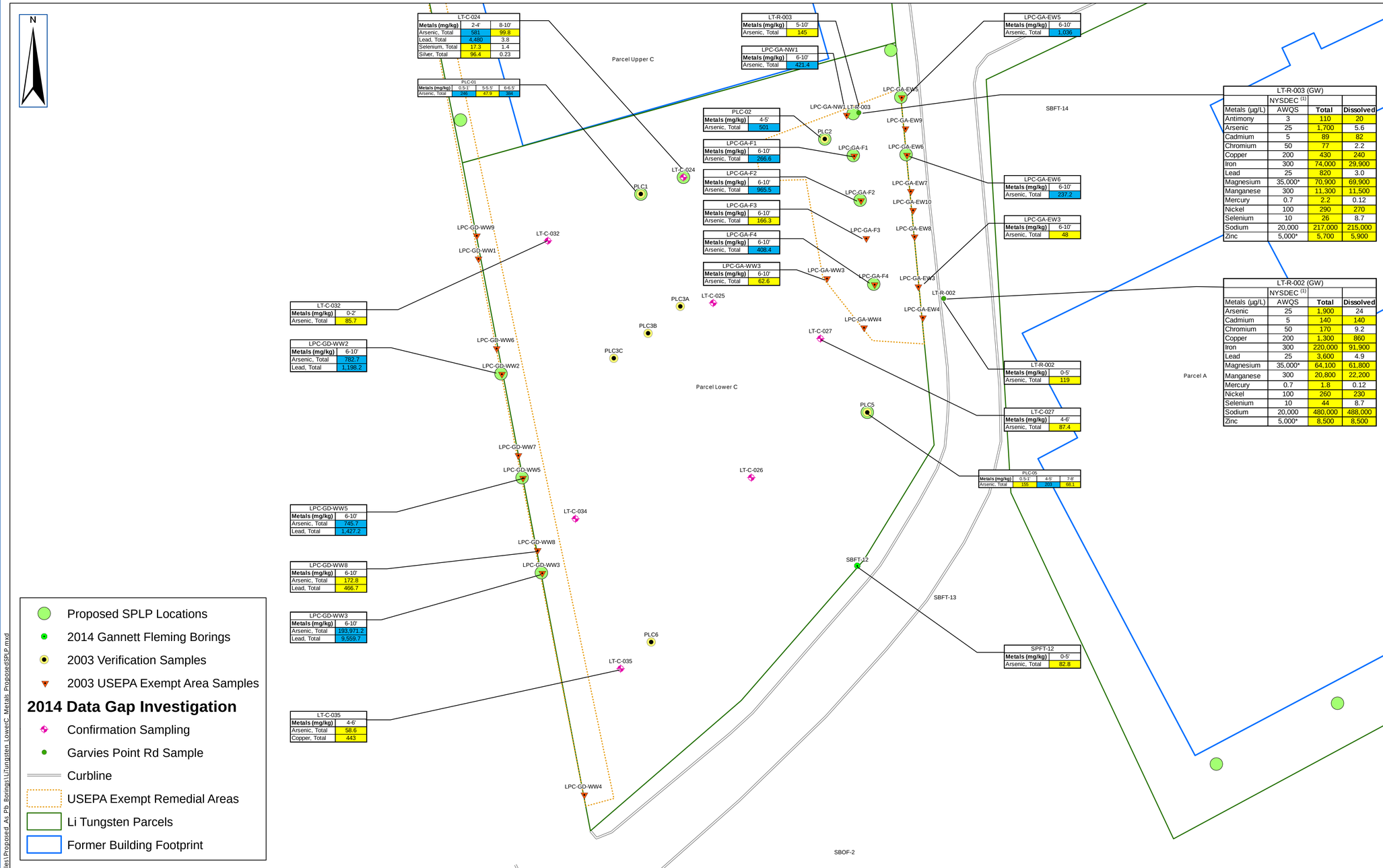
DRAWING INFORMATION:

| | | | |
|---|---|---|---|
| Project: | RGI1503 | Designed by: | DE |
| Date: | 3/31/2015 | Drawn by: | JCG |
| Scale: | AS SHOWN | Approved by: | DE |

FIGURE NO: 2

SHEET:


Document Path: Z:\Projects\M-R\RGI\1503\mapfiles\Proposed_As_Pb_Borings\LiTungsten_ParcelUpperC_Metals_ProposedAsPb.mxd




| LT-R-003 (GW) | | | |
|---|---|---|---|
| | NYSDEC (1) | | |
| Metals (µg/L) | AWQS | Total | Dissolved |
| Antimony | 3 | 110 | 20 |
| Arsenic | 25 | 1,700 | 5.6 |
| Cadmium | 5 | 89 | 82 |
| Chromium | 50 | 77 | 2.2 |
| Copper | 200 | 430 | 240 |
| Iron | 300 | 74,000 | 29,900 |
| Lead | 25 | 820 | 3.0 |
| Magnesium | 35,000* | 70,900 | 69,900 |
| Manganese | 300 | 11,300 | 11,500 |
| Mercury | 0.7 | 2.2 | 0.12 |
| Nickel | 100 | 290 | 270 |
| Selenium | 10 | 26 | 8.7 |
| Sodium | 20,000 | 217,000 | 215,000 |
| Zinc | 5,000* | 5,700 | 5,900 |

| LT-R-002 (GW) | | | |
|---|---|---|---|
| | NYSDEC (1) | | |
| Metals (µg/L) | AWQS | Total | Dissolved |
| Arsenic | 25 | 1,900 | 24 |
| Cadmium | 5 | 140 | 140 |
| Chromium | 50 | 170 | 9.2 |
| Copper | 200 | 1,300 | 860 |
| Iron | 300 | 220,000 | 91,900 |
| Lead | 25 | 3,600 | 4.9 |
| Magnesium | 35,000* | 64,100 | 61,800 |
| Manganese | 300 | 20,800 | 22,200 |
| Mercury | 0.7 | 1.8 | 0.12 |
| Nickel | 100 | 260 | 230 |
| Selenium | 10 | 44 | 8.7 |
| Sodium | 20,000 | 480,000 | 488,000 |
| Zinc | 5,000* | 8,500 | 8,500 |

Sampling Dates:

- 2014 Data Gap Samples collected from 1/13/2014 to 10/24/2014
- 2003 Verification Samples collected from 10/30/2003 to 11/11/2003
- Petroleum Endpoints collected from 10/1/2014 to 2/23/2015
- Gannett Fleming Samples collected from 10/6/2014 to 11/19/2014
- USEPA Exempt Area Samples collected from 10/27/2003 to 10/30/2003

Proposed SPLP Locations
2014 Gannett Fleming Borings
2003 Verification Samples
2003 USEPA Exempt Area Samples

**2014 Data Gap Investigation**

Confirmation Sampling
Garvies Point Rd Sample
Curbline
USEPA Exempt Remedial Areas
Li Tungsten Parcels
Former Building Footprint

| Standards | NYSDEC CUSCOs | NYSDEC POGWSCO | NYSDEC Source Definition | SPLP Action Level |
|---|---|---|---|---|
| Total Metals (mg/kg) | | | | |
| Arsenic, Total | 16 | 16 | 24 | 200* |
| Copper | 270 | 1,720 | 270 | - |
| Lead, Total | 1,000 | 450 | 450 | 1,000* |
| Selenium, Total | 1,500 | 4 | 4 | - |
| Silver, Total | 1,500 | 8.3 | 8.3 | - |

# LI TUNGSTEN - LOWER PARCEL C METALS

## GLEN ISLE

0 100 200 300 400 Feet

**Soil**

Exceeds NYSDEC Source Definition
Exceeds Anticipated SPLP Definition

**Groundwater**

Exceeds NYSDEC Class GA AWQS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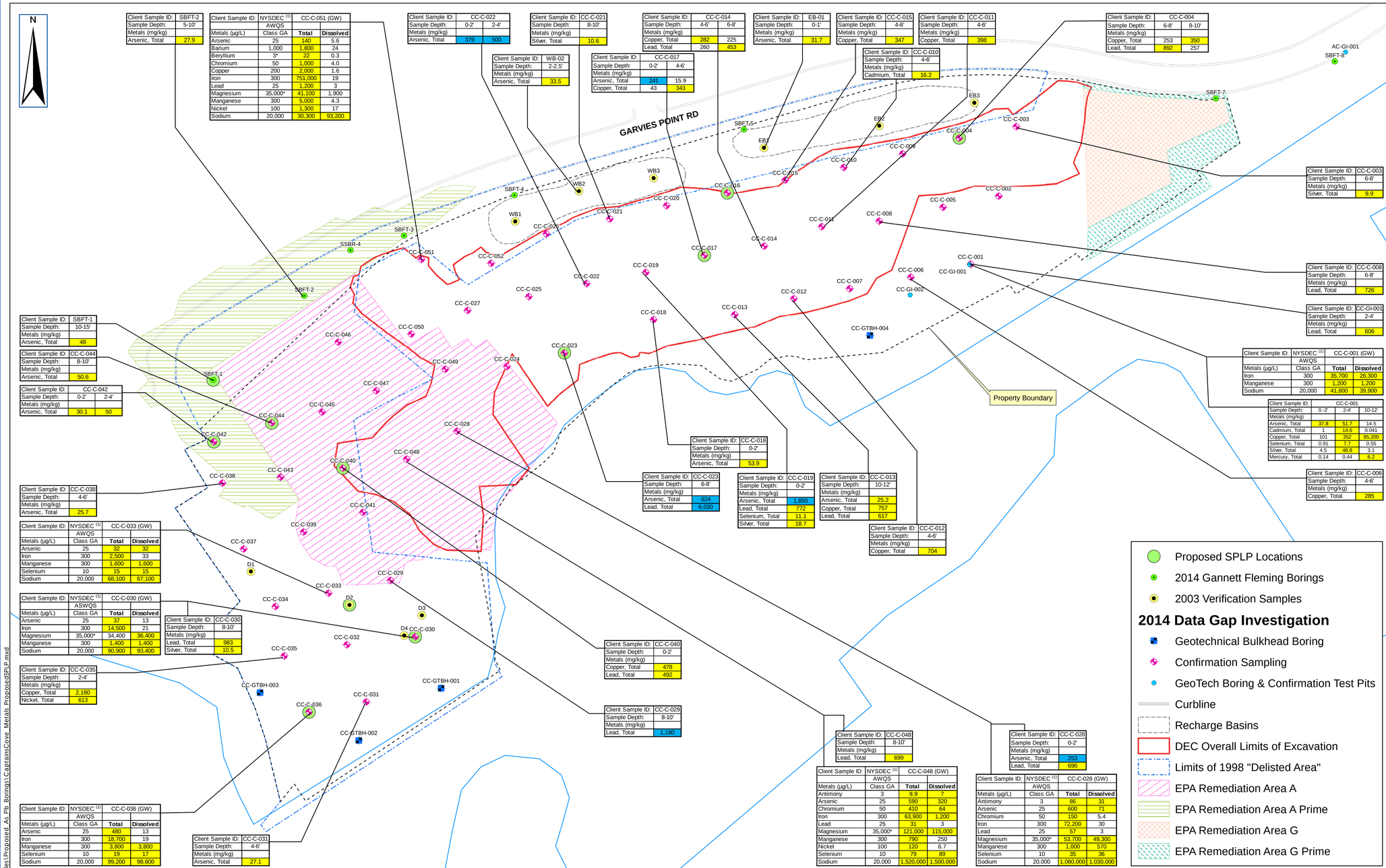
| | | | |
|---|---|---|---|
| Project: | RGI1503 | Designed by: | DE |
| Date: | 3/31/2015 | Drawn by: | JCG |
| Scale: | AS SHOWN | Approved by: | DE |

FIGURE NO: 3

SHEET:


Document Path: Z:\Projects\M-R\RGI\1503\mapfiles\Proposed_As_Pb_Borings\LiTungsten_LowerC_Metals_ProposedSPLP.mxd




| Client Sample ID: | SBFT-2 |
|---|---|
| Sample Depth: | 5-10' |
| Metals (mg/kg) | |
| Arsenic, Total | 27.9 |

| Client Sample ID: | NYSDEC [1] AWQS | CC-C-051 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Arsenic | 25 | 140 | 5.6 |
| Barium | 1,000 | 1,800 | 24 |
| Beryllium | 3* | 22 | 0.3 |
| Chromium | 50 | 1,000 | 4.0 |
| Copper | 200 | 2,000 | 1.6 |
| Iron | 300 | 751,000 | 19 |
| Lead | 25 | 1,200 | 3 |
| Magnesium | 35,000* | 41,100 | 1,900 |
| Manganese | 300 | 5,000 | 4.3 |
| Nickel | 100 | 1,300 | 17 |
| Sodium | 20,000 | 30,300 | 93,200 |

| Client Sample ID: | CC-C-022 | |
|---|---|---|
| Sample Depth: | 0-2' | 2-4' |
| Metals (mg/kg) | | |
| Arsenic, Total | 379 | 500 |

| Client Sample ID: | CC-C-021 |
|---|---|
| Sample Depth: | 8-10' |
| Metals (mg/kg) | |
| Silver, Total | 10.6 |

| Client Sample ID: | CC-C-014 | |
|---|---|---|
| Sample Depth: | 4-6' | 6-8' |
| Metals (mg/kg) | | |
| Copper, Total | 282 | 225 |
| Lead, Total | 260 | 453 |

| Client Sample ID: | EB-01 |
|---|---|
| Sample Depth: | 0-1' |
| Metals (mg/kg) | |
| Arsenic, Total | 31.7 |

| Client Sample ID: | CC-C-015 |
|---|---|
| Sample Depth: | 4-6' |
| Metals (mg/kg) | |
| Copper, Total | 347 |

| Client Sample ID: | CC-C-011 |
|---|---|
| Sample Depth: | 4-6' |
| Metals (mg/kg) | |
| Copper, Total | 398 |

| Client Sample ID: | CC-C-004 | |
|---|---|---|
| Sample Depth: | 6-8' | 8-10' |
| Metals (mg/kg) | | |
| Copper, Total | 253 | 350 |
| Lead, Total | 892 | 257 |

| Client Sample ID: | WB-02 |
|---|---|
| Sample Depth: | 2-2.5' |
| Metals (mg/kg) | |
| Arsenic, Total | 33.5 |

| Client Sample ID: | CC-C-017 | |
|---|---|---|
| Sample Depth: | 0-2' | 4-6' |
| Metals (mg/kg) | | |
| Arsenic, Total | 241 | 15.9 |
| Copper, Total | 43 | 343 |

| Client Sample ID: | CC-C-010 |
|---|---|
| Sample Depth: | 4-6' |
| Metals (mg/kg) | |
| Cadmium, Total | 16.2 |

| Client Sample ID: | CC-C-003 |
|---|---|
| Sample Depth: | 6-8' |
| Metals (mg/kg) | |
| Silver, Total | 9.9 |

| Client Sample ID: | CC-C-008 |
|---|---|
| Sample Depth: | 6-8' |
| Metals (mg/kg) | |
| Lead, Total | 726 |

| Client Sample ID: | CC-GI-001 |
|---|---|
| Sample Depth: | 2-4' |
| Metals (mg/kg) | |
| Lead, Total | 606 |

| Client Sample ID: | SBFT-1 |
|---|---|
| Sample Depth: | 10-15' |
| Metals (mg/kg) | |
| Arsenic, Total | 48 |

| Client Sample ID: | CC-C-044 |
|---|---|
| Sample Depth: | 8-10' |
| Metals (mg/kg) | |
| Arsenic, Total | 50.6 |

| Client Sample ID: | CC-C-042 | |
|---|---|---|
| Sample Depth: | 0-2' | 2-4' |
| Metals (mg/kg) | | |
| Arsenic, Total | 30.1 | 50 |

| Client Sample ID: | NYSDEC [1] AWQS | CC-C-001 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Iron | 300 | 35,700 | 26,300 |
| Manganese | 300 | 1,200 | 1,200 |
| Sodium | 20,000 | 41,800 | 39,900 |

| Client Sample ID: | CC-C-001 | | |
|---|---|---|---|
| Sample Depth: | 0.-2' | 2-4' | 10-12' |
| Metals (mg/kg) | | | |
| Arsenic, Total | 37.8 | 51.7 | 14.5 |
| Cadmium, Total | 1 | 14.6 | 0.041 |
| Copper, Total | 101 | 352 | 85,200 |
| Selenium, Total | 0.91 | 7.7 | 0.55 |
| Silver, Total | 4.5 | 48.8 | 3.1 |
| Mercury, Total | 0.14 | 0.44 | 6.2 |

| Client Sample ID: | CC-C-006 |
|---|---|
| Sample Depth: | 4-6' |
| Metals (mg/kg) | |
| Copper, Total | 285 |

| Client Sample ID: | CC-C-018 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Arsenic, Total | 53.9 |

| Client Sample ID: | CC-C-023 |
|---|---|
| Sample Depth: | 6-8' |
| Metals (mg/kg) | |
| Arsenic, Total | 624 |
| Lead, Total | 6,030 |

| Client Sample ID: | CC-C-019 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Arsenic, Total | 1,850 |
| Lead, Total | 772 |
| Selenium, Total | 11.1 |
| Silver, Total | 18.7 |

| Client Sample ID: | CC-C-013 |
|---|---|
| Sample Depth: | 10-12' |
| Metals (mg/kg) | |
| Arsenic, Total | 25.2 |
| Copper, Total | 757 |
| Lead, Total | 617 |

| Client Sample ID: | CC-C-012 |
|---|---|
| Sample Depth: | 4-6' |
| Metals (mg/kg) | |
| Copper, Total | 704 |

| Client Sample ID: | CC-C-038 |
|---|---|
| Sample Depth: | 4-6' |
| Metals (mg/kg) | |
| Arsenic, Total | 25.7 |

| Client Sample ID: | NYSDEC [1] AWQS | CC-C-033 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Arsenic | 25 | 32 | 32 |
| Iron | 300 | 2,500 | 33 |
| Manganese | 300 | 1,600 | 1,600 |
| Selenium | 10 | 15 | 15 |
| Sodium | 20,000 | 68,100 | 67,100 |

| Client Sample ID: | NYSDEC [1] ASWQS | CC-C-030 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Arsenic | 25 | 37 | 13 |
| Iron | 300 | 14,500 | 21 |
| Magnesium | 35,000* | 34,400 | 36,400 |
| Manganese | 300 | 1,400 | 1,400 |
| Sodium | 20,000 | 90,900 | 93,400 |

| Client Sample ID: | CC-C-030 |
|---|---|
| Sample Depth: | 8-10' |
| Metals (mg/kg) | |
| Lead, Total | 983 |
| Silver, Total | 10.5 |

| Client Sample ID: | CC-C-035 |
|---|---|
| Sample Depth: | 2-4' |
| Metals (mg/kg) | |
| Copper, Total | 2,190 |
| Nickel, Total | 613 |

| Client Sample ID: | CC-C-040 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Copper, Total | 478 |
| Lead, Total | 492 |

| Client Sample ID: | CC-C-029 |
|---|---|
| Sample Depth: | 8-10' |
| Metals (mg/kg) | |
| Lead, Total | 1,180 |

| Client Sample ID: | CC-C-048 |
|---|---|
| Sample Depth: | 8-10' |
| Metals (mg/kg) | |
| Lead, Total | 699 |

| Client Sample ID: | NYSDEC [1] AWQS | CC-C-048 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Antimony | 3 | 9.9 | 7 |
| Arsenic | 25 | 590 | 320 |
| Chromium | 50 | 410 | 64 |
| Iron | 300 | 63,900 | 1,200 |
| Lead | 25 | 31 | 3 |
| Magnesium | 35,000* | 121,000 | 115,000 |
| Manganese | 300 | 790 | 250 |
| Nickel | 100 | 120 | 6.7 |
| Selenium | 10 | 79 | 89 |
| Sodium | 20,000 | 1,520,000 | 1,500,000 |

| Client Sample ID: | CC-C-028 |
|---|---|
| Sample Depth: | 0-2' |
| Metals (mg/kg) | |
| Arsenic, Total | 253 |
| Lead, Total | 696 |

| Client Sample ID: | NYSDEC [1] AWQS | CC-C-028 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Antimony | 3 | 86 | 31 |
| Arsenic | 25 | 600 | 71 |
| Chromium | 50 | 150 | 5.4 |
| Iron | 300 | 72,200 | 30 |
| Lead | 25 | 57 | 3 |
| Magnesium | 35,000* | 53,700 | 49,300 |
| Manganese | 300 | 1,000 | 570 |
| Selenium | 10 | 35 | 36 |
| Sodium | 20,000 | 1,060,000 | 1,030,000 |

| Client Sample ID: | NYSDEC [1] AWQS | CC-C-036 (GW) | |
|---|---|---|---|
| Metals (µg/L) | Class GA | Total | Dissolved |
| Arsenic | 25 | 480 | 13 |
| Iron | 300 | 18,700 | 19 |
| Manganese | 300 | 3,800 | 3,800 |
| Selenium | 10 | 19 | 17 |
| Sodium | 20,000 | 99,200 | 98,600 |

| Client Sample ID: | CC-C-031 |
|---|---|
| Sample Depth: | 4-6' |
| Metals (mg/kg) | |
| Arsenic, Total | 27.1 |

Proposed SPLP Locations
2014 Gannett Fleming Borings
2003 Verification Samples

**2014 Data Gap Investigation**

Geotechnical Bulkhead Boring
Confirmation Sampling
GeoTech Boring & Confirmation Test Pits
Curbline
Recharge Basins
DEC Overall Limits of Excavation
Limits of 1998 "Delisted Area"
EPA Remediation Area A
EPA Remediation Area A Prime
EPA Remediation Area G
EPA Remediation Area G Prime

| Standards | NYSDEC CUSCOs | NYSDEC POGWSCO | NYSDEC Source Definition | SPLP Action Level |
|---|---|---|---|---|
| Arsenic, Total | 16 | 16 | 24 | 200* |
| Cadmium, Total | 9.3 | 7.5 | 9.3 | - |
| Copper, Total | 270 | 1,720 | 270 | - |
| Selenium, Total | 1,500 | 4 | 4 | - |
| Silver, Total | 1,500 | 8.3 | 8.3 | - |
| Lead, Total | 1,000 | 450 | 450 | 1,000* |
| Mercury, Total | 2.8 | 0.73 | 2.8 | - |

# CAPTAIN'S COVE METALS

## GLEN ISLE

0 250 500 750 1,000 Feet

**Soil**

Exceeds NYSDEC Source Definition

Exceeds Anticipated SPLP Definition

**Groundwater**

Exceeds NYSDEC Class GA AWQS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|---|---|---|---|
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| Date: | 3/31/2015 | Drawn by: | JCG |
| Scale: | AS SHOWN | Approved by: | DE |

FIGURE NO: 4

SHEET:

Document Path: Z:\Projects\M-R\RGI\1503\maps\Proposed_As_Pb_Borings\CaptainsCove_Metals_ProposedSPLP.mxd

**APPENDIX A**

**OCTOBER 30, 2014 LETTER – TABLE 1 SOURCE DEFINITION**

## Table 1: Source Material Definition

| Constituent | Restriction |
|---|---|
| VOCs | Part 375 Protection of Groundwater Concentrations |
| SVOCs | Part 375 Protection of Groundwater Concentrations |
| Pesticides | Part 375 Commercial restriction concentrations |
| PCBs | Part 375 Commercial restriction concentrations |
| Metals | The lower of Part 375 Commercial restriction concentrations or Protection of Groundwater with the exceptions noted below.<br><br>Lead – 450 mg/kg<br>Mercury – 2.8 mg/kg<br>Cadmium – 9.3 mg/kg<br>Copper – 270 mg/kg<br>Arsenic – 24 mg/kg unless otherwise demonstrated under SPLP.<br><br>***The NYSDEC is willing to consider a proposed arsenic concentration greater than the Part 375 Commercial restriction concentration but lower than 200 mg/kg, provided that the City can provided site Synthetic Precipitation Leaching Procedure (EPA Method 1312) data showing that the proposed concentration will not pose an unacceptable threat to groundwater.*** |
| Grossly Contaminated Material | As defined by 6 NYCRR Part 375 1.2(u) – soil, sediment, surface water or groundwater which contains sources or substantial quantities of mobile contamination in the form of NAPL , as defined as 375-1.2(ac), that is identifiable either visually, through strong odor, by elevated contaminant vapor levels, or is otherwise readily detectable without laboratory analysis. |

# APPENDIX B

# HEALTH & SAFETY PLAN

# SITE-SPECIFIC HEALTH AND SAFETY PLAN (SSHASP)

| | |
|---|---|
| Site: | Captains Cove, NYSDEC Registry No. 1-30-032, and Li Tungsten, NYSDEC Registry No. 1-30-046 and USEPA NPL No. NYD986882860 Sites |
| Location: | Glen Cove, NY |
| Date Prepared: | October 2012 |
| Project Description: | Bulkhead tieback inspection pits. 5 Test pits 5-7 feet deep, PID, radiation, lead/arsenic monitoring, dust and odor control, CAMP, soil management for quantity exceeding monitoring criteria. |
| Potential Chemical Hazards: | VOCs/SVOCs/PAHs, Lead, Arsenic, and radiation. |
| Status: | Inactive Site |

**SAFETY AND HEALTH POLICY FOR POSILLICO ENVIRONMENTAL**

The purpose of this policy is to develop a high standard of safety throughout all operations of Posillico Environmental and to ensure that no employee is required to work under any conditions, which are hazardous or unsanitary.

We believe that each employee has the right to derive personal satisfaction from his/her job and the prevention of occupational injury or illness is of such consequence to this belief that it will be given top priority at all times

It is our intention here at Posillico Environmental to initiate and maintain complete accident prevention and safety training programs. Each individual from top management to the working person is responsible for the safety and health of those persons in their charge and coworkers around them. By accepting mutual responsibility to operate safely, we will all contribute to the well-being of our employees.

**APPROVALS**

By their signature, the undersigned hereby certify that this Site Specific Health and Safety Plan (SSHASP) has been reviewed, modified for site-specific hazards and approved for use.

| | |
|---|---|
| PREPARER/INDUSTRIAL HYGIENIST | DATE |
| SAFETY DIRECTOR | DATE |
| PROJECT MANAGER | DATE |
| SITE SAFETY OFFICER | DATE |
| D&B PROJECT MANAGER | DATE |

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# 1.0 INTRODUCTION

## 1.1 Purpose

This Site Specific Health and Safety Plan (SSHASP) addresses the health and safety practices that will be employed by workers participating in test pit installation activities at the Bulkhead Test Pit Project.

The SSHASP includes procedures to be followed by Posillico Environmental (Posillico), Posillico subcontractors, and all third parties in order to avoid and if necessary, protect against health and/or safety hazards. Activities performed under this SSHASP will comply with Local City and State regulations as well as applicable parts of OSHA 29 CFR Parts 1910 and 1926 regulations. The control copy of this SSHASP will be maintained on-site for the duration of work.

All workers who may participate in activities at the Site under the direction of Posillico are required to comply with the provisions specified in this SSHASP. All third parties who enter designated work zones must also comply with this SSHASP. All personnel entering the exclusion zone or contamination reduction zone are required to review and sign this SSHASP. Refusal or failure to comply with the SSHASP or violation of any safety procedures by field personnel and/or subcontractors performing work covered by this SSHASP may result in immediate removal from the site following consultationn with the Project Superintendent (PS) or the Site Safety Officer (SSO).

In addition to the items discussed in this SSHASP, all of the rules, regulations and requirements of the most recent edition of Posillico's Corporate HASP are in effect during all site related activities.

## 1.2 Scope

This SSHASP has been developed to address the health and safety concerns at the Site during remedial actions under the direction of Posillico. Although the SSHASP addresses all activities listed below, work at individual locations may include all, or only some of these tasks.

The SSHASP will address all of the activities associated with the tasks to be performed on site and will be modified as the project progresses and the associated scopes change.

## 1.3 Application

The SSHASP applies to all personnel involved in the above tasks that are under the direction of Posillico, who wish to gain access to active work areas, including but not limited to:

- Federal, State or local representatives;

- The Property Owners and their Representatives;
- Visitors to the Site;
- General Contractor employees; and
- General Contractor subcontractors.

In the event non-Hazardous Waste Operations and Emergency Response (HAZWOPER) trained personnel enter the site for a visit, they will undergo a brief site orientation by the Site Safety Officer and will not be permitted to enter the Contamination Reduction Zone or the Exclusion Zone and while on site will be escorted by the Site Safety Officer, the Newport Project Manager, and/or the Construction Oversight Engineer while continually monitoring the atmosphere with a Photo Ionization Detector (PID). If personnel monitoring action levels (outlined in Table 6-1) reach level C Personal Protective Equipment (PPE) requirements, the visitors will exit the site until levels permit re-entry.

## 1.4 SSHSP Changes and Ammendments

This SSHASP is a living document. At times throughout the project changes to site operations and conditions may require changes to safety procedures. Any alteration, change or ammendment to the SSHASP will be documented, discussed and approved by Glen Cove IDA, Owner's Engineer, Posillico PM, and Posillico SSO. When changes to the SSHASP are completed, they will be discussed with the site crew during the daily safety meetings.

# 2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section specifies Posillico project organization and responsibilities. All Posillico personnel, including its subcontractors, will be responsible for adherence to the safety procedures during the performance of this project. Deviations from this SSHASP will not be allowed without express consent of the Posillico Safety Director (PSD). Project management and field supervisors for subcontractors are responsible for ensuring that their personnel will follow the procedures of this SSHASP. Violations of this SSHASP will result disciplinary action up to and including dismissal from site operations.

## 2.1 Project Manager (PM)

The PM responsibilities include the following:

- Ensures implementation of the SSHASP;
- Participates in incident investigations;
- Ensures the SSHASP has all of the required approvals before any site work is conducted; and
- Ensures the Labor Foreman, SSO, and PSD are informed of project changes which require modifications of the site safety plan.

## 2.2 Posillico Safety Director (PSD)

The PSD responsibilities include the following:

- Assists in the development and approval of the SSHASP;
- Approves revised or new safety protocols for field operations;
- Approves individuals who are assigned Health and Safety responsibilities;
- Coordinates revisions of this SSHASP with field personnel;
- Assists in Coordinating upgrades or downgrades of personal protective equipment with the PM and the site SSO;
- Assists with safety walkthroughs and safety inspections;
- Assists with the implementation of the SSHASP; and

- Assists in the investigation of all accidents/incidents.

## 2.3 Site Safety Officer (SSO)

The Site Safety Officer responsibilities include the following:

- Ensures that all health and safety activities identified in this SSHASP are conducted and/or implemented;
- Determines upgrades or downgrades of personal protective equipment (PPE) based on site conditions and/or real-time monitoring and personnel sampling results;
- Identifies operational changes which require modifications to health and safety procedures and site safety plans, and ensures that the procedure modifications are implemented and documented through changes to the SSHASP, with PSD approval;
- Directs and coordinates health and safety monitoring activities;
- Ensures proper personal protective equipment is utilized by field teams;
- Conducts weekly safety inspections of work areas;
- Monitors compliance with this SSHASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves revised or new safety protocols for field operations;
- Approves individuals who are assigned health and safety responsibilities;
- Coordinates revisions of this SSHASP with field personnel;
- Assists in the investigation of accidents/incidents;
- Performs real-time monitoring and personnel sampling and reporting/recordkeeping;
- Obtains copies of all required certifications/licenses for personnel to be on-site;
- Rotates in conducting daily safety huddle with PM.

- Coordinates health and safety monitoring activities with PS/PM; and

## 2.5 Site Personnel

The Site Personnel responsibilities include the following:

- Report any unsafe or potentially hazardous conditions to the PM and SSO;
- Maintain knowledge of the information, instructions and emergency response actions contained in the SSHASP;
- Comply with rules, regulations and procedures as set forth in this SSHASP and any revisions;
- Prevent admittance to work sites by unauthorized personnel; and
- Inspect all tools and equipment, including PPE, prior to use each day.

## 2.6 Subcontractors

At a minimum, subcontractors will comply with this SSHASP. If necessary, a SSHASP Addendum or Job Hazard Analysis will be prepared for subcontractor tasks and will be added to this SSHASP to cover additional hazards. The General Contractor will evaluate the safety performance of its on-site subcontractors in the same manner that it evaluates its own performance. All Posillico subcontractors will be required to sign the SSHASP acknowledgement form located in Section 13.0, to attend daily safety meetings, and to notify the PM, SSO and Labor Foreman of planned operations at the beginning of each day.

Subcontractors will provide:

- A written description of required safety needed for the job;
- Applicable safety training and medical surveillance documentation as well as licenses and certifications; including medicals (if required).
- The name and telephone number of the SSO responsible for safety on site.

### 2.6.1 Truck Driver Policy

All truck drivers will adhere to site traffic rules including no idling to prevent unnecessary perimeter air alarms, staying on designated haul roads, adhering to the direction or spotters, and following the designated trucking route. A truck driver orientation will be prepared prior to the commencement of trucking, which will be sign by each transporter of contaminated material. There will be a zero tolerance policy for drivers who do not adhere to the site traffic rules.

# 3.0 POTENTIAL HAZARDS AT THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under Section 1.2. A Hazard Communication Program is included in Appendix B. The Hazard Communication Program describes the procedures for determining hazards posed by a chemical, providing proper training on those hazards and transmitting the hazard information to those who could come in contact with the chemical.

## 3.1 Chemical Hazards

The characteristics of compounds at the Site are discussed below for informational purposes. Adherence to the safety and health guidelines in this SSHASP will reduce the potential for exposure. Personnel shall familiarize themselves with the characteristics of the known chemicals and their properties. Listed below is the chemical information regarding exposure for the following chemicals.

### 3.1.1 Semi-Volatile Organic Compounds/Polycyclic Aromatic Hydrocarbons

Semi-Volatile Organic Compounds (SVOCs) are present at the Site in impacted soil and groundwater in the sorbed phase, dissolved phase, or in the gas phase. 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. The primary routes of exposure include inhalation, skin absorption or ingestion. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation.

Polycyclic aromatic hydrocarbons (PAHs) are present at the Site in impacted soil and groundwater. These compounds generally have a depressant effect on the CNS, may cause chronic liver and kidney damage, and some are suspected human carcinogens. The primary routes of exposure include inhalation, skin absorption or ingestion. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation.

Benzene is present at the Site in impacted soil and ground water. This compound may affect the bone marrow and blood production. The primary routes of exposure are inhalation, absorption and ingestion. Acute exposure may include drowsiness, dizziness and unconsciousness.

Hydrogen Sulfide is present at the Site in impacted soil in the gas phase. This gas generally has adverse effects on eyes and the respiratory system. The primary route of exposure is inhalation. Acute exposure may include dizziness, headache, nausea, coughing and vomiting.

Hydrogen Cyanide is present at the Site in impacted soil. This compound has effects on the respiratory system. The primary routes of exposure are inhalation, ingestion and skin absorption. Acute exposure may include weakness, confusion, vertigo, fatigue, nausea and vomiting.

Mercury is present at the Site in impacted soil. This compound has effects on the nervous system and kidneys. The primary routes of exposure are inhalation, absorption and ingestion. Acute exposure may include dyspnea, elevated body temperature, headaches; fatigue and weakness.

Information on SVOC/VOC and PAH permissible exposure limits (PELs) are located in Table 6.1 (Real Time Air Monitoring Action Levels).

### 3.1.2 Metals

The Site potentially contains elevated levels of metals including arsenic and lead. The primary routes of this exposure for these compounds are inhalation (of particles containing these compounds) and ingestion. Acute exposure to arsenic may cause dermatitis, gastrointestinal (GI) disturbances and respiratory irritation. Chronic exposure to arsenic has resulted in lung cancer in humans.

Acute exposure to Lead may cause irritated eyes, skin; cough, chest pain, dyspnea (i.e., breathing difficulty), bronchitis, headache, irritability and salivation. Chronic effects of Lead include gastrointestinal disturbance, anorexia, weight loss, proteinuria, tremor and insomnia.

### 3.1.3 Other Chemical Hazards

Methane and Carbon Monoxide may also be present onsite. Methane can be produced during the natural decomposition of organic compounds in soil. Carbon Monoxide is a byproduct of petroleum combustion and is present in the exhaust of site machines, vehicles, and equipment. However, because of the openness of the site and excavation being done in the open air, Methane and Carbon Monoxide are not anticipated to be a serious concern. Radioactive material is also a potential to exist on site.

Radiation may be present on the site. Radiation may have an adverse effects on tissue cells and is considered a carcinogen. The primary routes of exposure are absorption, inhalation and ingestion. Acute exposure may include skin irritation, vomiting, nausea, headache, diarrhea and fevers.

Chemicals not identified in this SSHASP may be used during investigation and remediation activities. Prior to the initiation of these tasks, Material Safety Data Sheets (See MSDS Binder) will be obtained for each of the chemicals to be used and all site workers and visitors who may potentially be exposed will be made aware of these hazards. As part of the hazard communication requirments (Appendix B), a separate MSDS binder will be maintained in the General Contractor's on-site trailer, as per Hazard-Communication Program 29 CFR Subsection 1910.1200.

## 3.2 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals, insects and plants. Workers will be instructed in hazard recognition, health hazards, and control measures during site-specific training.

### 3.2.1 Animals

During the conduct of site operations, wild animals such as stray dogs or cats, raccoons, rats, birds and mice may be encountered. Workers shall use discretion and avoid all contact with wild animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting the City of Glen Cove Animal Shelter at 516-676-5913

### 3.2.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, ticks and spiders, may be present at the Site making the chance of a bite possible. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition; any individuals who have been bitten or stung by an insect should notify a supervisor immediately. The following is a list of preventive measures:

- Apply insect repellent prior to performing any field work and as often as needed throughout the work shift.
- Wear proper protective clothing (work boots, socks and light colored pants).
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible.
- Field personnel who may have insect allergies shall have bee sting allergy medication on site and should provide this information to the PM and SSO prior to commencing work.

- It is recommended that personnel check themselves when in areas that could harbor insects, wear light color clothing and visually check themselves and their buddy when coming from wooded or vegetated areas.

#### 3.2.3 Plants

The potential for contact with poisonous plants exists when performing fieldwork in undeveloped and wooded areas. During clearing and grubbing of the site, poison ivy, sumac, and oak may be encountered. 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 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 oak can be present as a sparingly branched shrub. Poison oak is similar to poison ivy in that it has the same leaflet configuration; however, the leaves have slightly deeper notches. Prophylactic application of Tecnu (i.e., commercially available skin cleanser) may prevent the occurrence of exposure symptoms. Post exposure over the counter products are available and should be identified at the local pharmacist. Susceptible individuals should notify the PM or SSO.

Contact with poison ivy, sumac, or oak may lead to a skin rash, characterized by reddened, itchy, blistering skin which needs first aid treatment. 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.

A medical fact sheet will be kept in all personnel files by the site safety officer. The confidential fact sheet will include information on all allergies, medications, and emergency contact information.

### 3.3 Physical Hazards/Safety Considerations

A variety of physical hazards may be present during Site activities. The most common hazards are struck-by/against hazards; slips, trips, and falls; equipment hazards and temperature extreme (cold and heat) stress. Other physical hazards are due to the use of hand and power tools and material handling. Additional specific safety requirements may be covered during safety briefings at the Site.

During all activities, personnel shall strictly adhere to the following:

- The buddy system (i.e., two or more workers assigned to a task to assist each other to safely get the task done) or line of sight (making sure equipment

operators or workers view of the work area is not blocked) will be used during intrusive work; and

- If field personnel perceive an unsafe condition or situation, the SSO will be notified immediately .

### 3.3.1 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, poor judgment and unauthorized procedural changes. The procedures to be followed are found in Appendix C.

### 3.3.2 Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke. A heat stress prevention program will be implemented when ambient temperatures exceed 70ºF for personnel wearing impermeable clothing. The procedures to be followed and methods for employee physiological monitoring are found in Appendix D.

### 3.3.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Site workers who will perform suspected high noise tasks and operations for short durations (less than 1-hour) would be provided with hearing protection devices. If deemed necessary the PS and SSO will be consulted on the need for additional hearing protection and the need to monitor sound levels for site activities. Posillico's corporate hearing conservation program is attached as Appendix E and is provided for example purposes only.

### 3.3.4 Hand and Power Tools

In order to complete the various tasks for the project, personnel will utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating personnel at all times when utilizing hand and power tools and GFI-equipped circuits will be used for all power tools. Tool inspections will be conducted prior to each work shift by labor force that will use the tool. Damaged tools will be tagged out of service and repaired. Additional procedures to be followed when using hand and power tools are attached in Appendix F.

### 3.3.5 Slips, Trips, and Falls

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be oil covered, or from surfaces that are wet from rain or ice. Excavation at the sites will cause uneven footing in the trenches and around the spoil piles. Daily housekeeping inspections of the work areas will be conducted to identify, eliminate, and control slip trip and fall hazards.

### 3.3.6 Fire and Explosion

When conducting excavating activities, the opportunity of encountering fire and explosion hazards exists from contamination in the soil and the possibility of free product in the underground pipelines. This will be especially hazardous when pipelines are sawed or broken to grout the ends. Before an inactive utility line can be sawed or broken for capping purposed, a Line Break Permit is required to be duly executed by the PM and reviewed by the SSO. See Appendix G for an example of the Line Break Permit.

For utilities (pipelines) that are determined to be inactive, initial penetration of the utility line will involve use of spark-proof drilling tools to create a small hole in the utility line. (A utility deemed active would be handled by its respective utility owner.) Access to the interior of the line will allow initial screening of the internal atmosphere with a combustible gas indicator (CGI)/$O_2$/$H_2S$/HCN meter and PID/FID, as described in Section 6. Action levels presented in Table 6-1 will be used to determine if a dangerous or explosive atmosphere is present within the utility line. If screening indicates that a potentially explosive environment exists within the utility line, one or both of the following activities will be taken to mitigate flammable vapors:

- Purge or ventilate the utility line; and or
- Inert the utility line with a non-reactive gas (e.g. carbon dioxide or nitrogen).

Prior to and during purging or inerting of the utility line, all potential sources of ignition will be removed from the immediate work area. Once screening has identified acceptable conditions within the utility line, a non-sparking saw, such as a “Nibbler”, or similar, will be used to cut and remove a section of pipe. The process will be continued until all residual products can be extracted and containerized.

Additionally, the use of a diesel engine on excavating equipment could present the possibility of encountering fire and explosion hazards. See Section 8.0 of the most recent edition of the Posillico Corporate HASP for reference on further precautions and procedures in dealing with Fire and Explosions.

In the event that a fire or explosion is serious enough to warrant evacuation or coordinated emergency response; all employees will be instructed to follow the Emergency Response/Contingency Plan in Section 10.0 of this document.

### 3.3.7 Manual Lifting

Manual lifting of heavy objects such as sections of pipe may be required. Failure to follow proper lifting technique can result in back injuries and strains. Site workers will be instructed to use power equipment to lift heavy loads whenever possible and to evaluate loads before trying to lift them (i.e. they should be able to easily tip the load and then return it to its original position).

Carrying heavy loads with a buddy and proper lifting techniques:

1) Make sure footing is solid.
2) Make back straight with no curving or slouching.
3) Center body over feet.
4) Grasp the object firmly and as close to your body as possible.
5) Lift with legs.
6) Turn with your feet, to avoid stress in the lower back.

Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods. In addition, hand digging for pipes may present lifting/ergonomic hazards.

### 3.3.8 Heavy Equipment Operations

Excavators, loaders, bulldozers, compactors, and dump trucks will be utilized in trenching, excavation, and backfilling operations. Working with or near heavy equipment poses many potential hazards, including electrocution, fire/explosion, being struck by or against, or pinched/caught/crushed by, and can result in serious physical harm. Prior to each work shift, operators will inspect their equipment using the Daily Equipment Checklist (or an equivalent form) attached in Appendix H, which also contains information on Motorized Vehicle and Equipment Operation. Dump truck inspections will be conducted and recorded prior to loading soils.
Heavy equipment will be operated under the following conditions:

- The operation of heavy equipment will be limited to authorized personnel specifically trained in its operation. The subcontractor site supervisors must provide this information to the PM and SSO.

- The operator will use the safety devices provided with the equipment, including seat belts. Backup warning indicators and horns will be operable at

all times.

- While in operation, all personnel not directly required in the area will keep a safe distance from the equipment.

- Personnel directly involved in activity will avoid moving in the path of operating equipment or any portion thereof. Areas blinded from the operator's vision will be avoided. Spotters will be used when personnel may be in areas where the operator's view is obstructed.

- Additional riders will not be allowed on equipment unless it is specifically designed for that purpose.

- The following hand signals will be used specifically for heavy machinery operation in order to safely move equipment throughout the site:

| | |
|---|---|
| Hand raised with palm facing forward | Stop vehicle/action |
| Hand raised and moving towards operator | Back up vehicle |
| Raising right/left arm | Move vehicle right/left |

### 3.3.9 Lockout/Tagout

The use of power tools and extension cords may pose electrical hazards to workers. Additionally overhead electrical lines on the Site are of potential concern during excavation and trenching. Potential adverse effects of electrical hazards include shocks, burns, and electrocution, which could result in death.

Site personnel will assume that all electrical equipment (surface, subsurface and overhead and machinery/equipment) is energized, until a Posillico representative has designated the electrical equipment as de-energized. If the equipment cannot be designated as de-energized, work shall stop and the PM/SSO, PSD will meet to determine a safe path forward. Prior to beginning work personnel shall verify that the equipment is energized or de-energized in the vicinity of the construction area. Posillico's Control of Hazardous Energy Programs (Lock Out/Tag Out) is included in Section 8.0 of Posillico's Corporate HASP (Appendix E).

If power lines cannot be de-energized, the SSO will consult with LIPA safety personnel to determine the safe working distance from the energized line. Work tasks will only commence after determination that a safe working distance can be maintained and all personnel working in the area have been informed of the limitation, and received activity specific training.

In the event that an employee is seriously hurt from being electrocuted; all employees will be instructed to follow Posillico Emergency Response Plan in Section 10.0 of this document.

### 3.3.10 Activities in Proximity to Overhead and Underground Utilities

Extreme care will be used during the implementation of the test pit installation activities so as not to damage or interfere with existing utilities. Setbacks for overhead lines for all equipment and personnel are noted in Section 3.3.17.

In addition to overhead utilities, there are underground utilities that exist near the work area. Extreme care will be used during the implementation of the test pit installation activities so as not to damage or interfere with these underground utilities and Posillico shall support and protect these utilities if required. The Posillico Underground Utility Safety Procedures can be found in Section 8.0 of the most recent edition of Posillico's Corporate HASP.

### 3.3.11 Aerial Lift Usage

Workers on site may use various aerial lifts in the process of performing work tasks. Located in Section 8.0 of Posillico's Corporate HASP (Appendix E), are the procedures for safe aerial lift usage. The procedures are based on codes and standards adopted in the Work Smart Standards (WSS) for aerial lifts, along with manufacturers' recommendations and other standards that apply for Posillico activities.

### 3.3.12 Excavation and Trenching

Hazardous associated with excavation and trenching include engulfment, entrapment, bank collapse, contact with underground utilities, and water infiltration. When working inside an excavation or trench, these hazards need to be considered.

To support and protect the excavation in Area 1A and potentially in alternate Areas 5, 6 and 7 (if necessary) of the project, Posillico will implement either a shoring box or a modular slide rail shoring system designed specifically for environmental remediation projects provided by American Shoring Inc. or an equal. The system will be a P.E.-engineered system and will have a P.E. stamp on design drawings and specifications. The shoring box or slide rail system will allow Posillico to safely support excavation areas by shoring excavation walls on all four sides of the system.

The shoring system consists of four four-sided posts and side panels of various lengths depending on the size of the excavation area. As the ground is excavated the shoring system is lowered into the ground and the panels are added until the

required excavation depth is achieved. Since each corner post is four-sided, panels can be added in all four directions. The next box will be adjacent to the previous excavation sharing a common wall. As the excavation in one area is completed, additional posts and panels are added to create a new shoring box enclosure.

A competent person, as defined by OSHA and approved by the SSO, who is capable of identifying existing and predictable hazards and work conditions that are unsanitary, hazardous, or dangerous to employees must determine the safety requirements for each excavation and for the shoring system. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions.

A more detailed list of Posillico's Trenching and Excavation Procedures are located in Section 8.0 of Posillico's Corporate HASP (Appendix E).

### 3.3.13 Confined Space Entry

All trenches or excavations deeper than five feet will initially be considered potential permit required confined spaces. Prior to entry, each excavation deeper than 5 feet will be monitored for oxygen content, combustible gases, and toxic gases and vapors. When atmospheric conditions are below action levels, normal entry will be permitted and monitoring will be continued. If action levels are exceeded, the trench will be immediately vacated, and the area will then be re-classified as a Permit Required Confined Space. All entry into an excavation or trench classified as a Permit Required Confined Space will be performed in accordance with Section 8.0 of Posillico's Corporate HASP (Appendix E) and Appendix I, Confined Space Entry.

### 3.3.14 Fall Protection

Posillico requires 100 percent tie-off for working heights in excess of above 6 feet of a working surface. During the test pit installation, there is a potential for injuries caused by falls from unprotected leading edge at the existing bulkhead. Posillico shall take precautions to ensure that all leading edges of excavations and trenches are protected in accordance with OSHA 29 CFR 1926. If during the excavations a worker is required to assist the process in an aerial lift, they shall be protected from falls by an appropriate harness and latching system as described in OSHA CFR 1926. Posillico's Fall Protection Program is located in Section 8.0 Posillico's Corporate HASP (Appendix E).

### 3.3.15 Welding and Cutting Safety Rules

Hazards associated with welding and cutting include noxious fumes, potential contact with heated materials, sharp edges, eye retina damage from ultraviolet

light, and fire hazards. To mitigate exposure to hazards, all employees performing welding and cutting on site must adhere to Posillico's Welding and Cutting Safety Rules attached in Appendix J.

### 3.3.16 Steam, Heat, Splashing

Exposure to steam/heat/splashing hazards can occur during steam cleaning activities. Exposure to steam/heat/splashing can result in scalding/burns, eye injury, and puncture wounds. Proper PPE will be worn during all steam cleaning activities including rain gear or Tyvek, hardhat equipped with splashguard, and water resistant gloves and boots.

### 3.3.17 Electrocution

The use of power tools and extension cords may pose electrical hazards to workers if power cords become damaged, exposing the bare wire. Cords will be inspected prior to use and taken out of commission or repaired if damaged. Additionally overhead or underground electrical lines are of potential concern during excavation, trenching, sheet pile driving, tent mobilization and demobilization. Site specific precautions will be followed to maintain a safe working distance and to alert all workers to the electrical dangers. Underground utilities will be located (see Section 3.3.10) and surveyed using "soft dig" techniques, which involves utilizing hand tools to safely excavate without severing buried pipes/lines/conduit. Warning signs will also be posted to demarcate the required offsets for the overhead electrical lines. All equipment and personnel will be required to maintain setbacks of ten (10) feet for the energized overhead electrical line. Potential adverse effects of electrical hazards include shocks, burns, and electrocution, which could result in death.

### 3.3.18 Severe Weather

Outdoor operations will cease in the event of severe weather conditions as decided by the SSO, Engineer, PM, or Labor Foreman. Severe weather may include but not limited to heavy rains, high winds, snow and ice. All heavy equipment use will cease prior to the onset of a thunderstorm regardless of the stage of activity. Work will continue 30 minutes after thunderstorm, work continuation after other severe weather will be determined by SSO and/or competent person overseeing operation.

# 4.0 ACTIVITY HAZARD ANALYSIS

Activity Hazard Analysis (AHAs) are a systematic way of identifying the potential health and safety hazards associated with the activities required for completion of the work and the methods to avoid, control and mitigate those hazards. The AHAs will be used to train work crews in proper safety procedures during training prior to each phase of work.

Below is a Project Wide AHA developed for this project. Additional and more detailed AHAs will be developed for specific work tasks prior to the commencement of each activity.

**Phase of Work:** Mobilization/Demobilization
**Tasks:** Mobilization and Demobilization of Equipment and Supplies, Establishment of Site Security, Work Zones and Staging Areas, Site restoration (re-establishment of stabilization cover, site grading, replacement of fences, etc.).

| HAZARDS | CONTROL MEASURES |
|---|---|
| Slips/trips/falls | • Maintain alertness to slip/trip/fall hazards;<br>• Maintain good housekeeping;<br>• Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas;<br>• Walk, do not run; and<br>• Wear footwear with soles that grip. |
| Manual lifting and material handling | • Use proper lifting techniques; and<br>• Team lifting will be used for heavy loads or use mechanical lifting devices. |
| Temperature extremes | • Drink plenty of fluids;<br>• Train personnel of signs/symptoms of heat/cold stress;<br>• Monitor air temperatures when extreme weather conditions are present;<br>• Stay in visual and verbal contact with your buddy; and<br>• Use Cold Stress and Heat Stress program. |
| Hand tool usage | • Daily inspections will be performed;<br>• Remove broken or damaged tools from service;<br>• Use the tool for its intended purpose; and<br>• Use in accordance with manufacturer instructions. |
| Back injuries | • Follow proper lifting techniques: lift with legs, keep load close to the body, do not bend or twist with load, test load prior to lift; get help for heavy or awkward loads, clear path.<br>• Site personnel will be instructed on proper lifting techniques; mechanical devise should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available. |

| HAZARDS | CONTROL MEASURES |
|---|---|
| Vehicular Traffic | • Spotters will be used when backing up trucks and heavy equipment and when moving equipment. |
| Overhead Hazards | • Personnel will be required to wear hard hats that meet ANSI Standard Z89.1;<br>• All ground personnel will stay clear of suspended loads;<br>• All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and<br>• All overhead hazards will be identified prior to commencing work operations. |
| Noise | • Ear plugs or ear muffs. |
| Dropped Objects | • Boots meeting ANSI Standard Z41 will be worn. |
| Eye Injuries | • Safety glasses meeting ANSI Standard Z87 will be worn. |
| Fire/Explosion | • ABC type fire extinguishers shall be readily available;<br>• And no smoking in work area. |
| Electrocution | • Equipment will be equipped with GFCI;<br>• All electrical work will be conducted by a licensed electrician;<br>• All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV. |
| Pinch/Cut/Smash | • Cut resistant Kevlar work gloves will be worn when dealing with sharp objects;<br>• All hand and power tools will be maintained in safe condition; and<br>• Guards will be kept in place while using hand and power tools. |
| Biological hazards | • Be alert to the presence of biological hazards;<br>• Wear insect repellent;<br>• Follow procedures in Section 4.2.3 for tick bites;<br>• PS should be aware of on-site personnel with allergic reactions in insect bites and stings. A medical fact sheet will be kept by the SSO for each site personnel. |
| Equipment Fueling | • Turn equipment off while refueling to eliminate ignition source<br>• Make sure gas can/funnel will be bonded to gas tank of equipment being fueled. |

**Phase of Work:** Pre-Construction and Site Preparation
**Tasks:** Delineate and Protect Utilities located on site and those leading to and from the Site, Site Preparation (installation of soil erosion measures, etc.) and Clearing and Grubbing, Prepare decontamination pads and facilities

| HAZARDS | CONTROL MEASURES |
|---|---|
| Slips/trips/falls | • Maintain alertness to slip/trip/fall hazards;<br>• Maintain good housekeeping;<br>• Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas;<br>• Walk, do not run; and<br>• Wear footwear with soles that grip. |
| Manual lifting and material handling | • Use proper lifting techniques; and<br>• Team lifting will be used for heavy loads or use mechanical lifting devices. |
| Temperature extremes | • Drink plenty of fluids;<br>• Train personnel of signs/symptoms of heat/cold stress;<br>• Monitor air temperatures when extreme weather conditions are present;<br>• Stay in visual and verbal contact with your buddy; and<br>• Use Cold Stress and Heat Stress program. |
| Hand tool usage | • Daily inspections will be performed;<br>• Remove broken or damaged tools from service;<br>• Use the tool for its intended purpose; and<br>• Use in accordance with manufacturer instructions. |
| Back injuries | • Follow proper lifting techniques: lift with legs, keep load close to the body, do not bend or twist with load, test load prior to lift; get help for heavy or awkward loads, clear path; and<br>• Site personnel will be instructed on proper lifting techniques; mechanical devise should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available. |
| Vehicular Traffic | • Spotters will be used when backing up trucks and heavy equipment and when moving equipment. |
| Overhead Hazards | • Personnel will be required to wear hard hats that meet ANSI Standard Z89.1;<br>• All ground personnel will stay clear of suspended loads;<br>• All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and<br>• All overhead hazards will be identified prior to commencing work operations. |
| Noise | • Ear plugs or ear muffs. |
| Dropped Objects | • Boots meeting ANSI Standard Z41 will be worn. |
| Eye Injuries | • Safety glasses meeting ANSI Standard Z87 will be worn. |

| HAZARDS | CONTROL MEASURES |
|---|---|
| Fire/Explosion | • ABC type fire extinguishers shall be readily available; and<br>• And no smoking in work area. |
| Electrocution | • Equipment will be equipped with GFCI;<br>• All electrical work will be conducted by a licensed electrician; and<br>• All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV. |
| Pinch/Cut/Smash | • Cut resistant Kevlar work gloves will be worn when dealing with sharp objects;<br>• All hand and power tools will be maintained in safe condition;<br>• Guards will be kept in place while using hand and power tools;<br>• Stand clear of branches being sent through the chipper;<br>• Stand clear of moving parts;<br>• Recognition/communication of potential pinch points; and<br>• Use tag lines to prevent branches from striking picker bucket. |
| Flying Debris | • Wear necessary PPE, Eye protection, face shield. |
| Chain Saw Kick Back | • Use of appropriate extra PPE (face shield, chaps, leather work gloves, etc.);<br>• Only trained personnel operating tools; and<br>• Inspection of tools and all components. |
| Falling Objects | • Make sure work area is clear before cutting branches or trees;<br>• Alert others of your actions prior to performing them;<br>• Wear proper PPE (safety glasses, hard hat, sturdy leather work boots, etc.); and<br>• Use tag lines to soften fall of large branches. |
| Chipper jam | • Ensure wood chipper is turned off before performing any maintenance. |
| Falls | • Wear appropriate fall protection when working at heights of 6’ or greater;<br>• Inspection of all fall protection components prior, during, and after use (harness, lanyard, etc.); and<br>• Ensure training on operation of bucket. |
| Biological hazards | • Be alert to the presence of biological hazards;<br>• Wear insect repellent;<br>• Follow procedures in Section 4.2.3 for tick bites; and<br>• PM should be aware of on-site personnel with allergic reactions in insect bites and stings. A medical fact sheet will be held onsite by the SSO in the personnel files. |

**Phase of Work:** Construction Activities
**Tasks:** Support of existing utilities (if necessary)
Install Support of Excavation System

| HAZARDS | CONTROL MEASURES |
|---|---|
| Slips/trips/falls | • Maintain alertness to slip/trip/fall hazards;<br>• Maintain good housekeeping;<br>• Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas;<br>• Walk, do not run; and<br>• Wear footwear with soles that grip. |
| Stability of terrain/landslide | • **Assessment** of ground conditions (soil stability, presence of water, etc.) prior to start of activity. If any conditions are deemed less than adequate by a competent person on site, work will cease until conditions improve; and<br>• Ensure footing is stable before attempting to navigate terrain. |
| Manual lifting and material handling/ ergonomic concerns | • Utilize proper lifting techniques (bend at the knees instead of the back to reduce unnecessary strain);<br>• Carry loads close to your body;<br>• Do not twist your body when handling loads; shuffle your feet instead;<br>• Do not attempt to lift anything that is too heavy or awkward to lift alone, get another individual to assist in the lift or have a piece of equipment move the item; and<br>• Wear proper PPE (leather gloves) to guard against potential puncture hazards when handling debris. |
| Heavy equipment maneuverability/ working near heavy equipment | • Ensure proper stability of area where equipment will operate;<br>• Ensure daily equipment **inspections** are completed to make sure all lights, horns, and alarms are working properly;<br>• Wear seatbelts at all time while operating equipment;<br>• No electronic devices (cell phones, music players, etc.) will be used while operating equipment;<br>• Ensure that ground personnel are out of the way of the excavator. If ground personnel need to work in close proximity to equipment, ensure that proper PPE (highly visible vests, hard hats, etc.) is worn at all times and Laborers and Operators verbally review non-verbal communication before activity begins; and<br>• Ensure that emergency procedure located in SSHASP is communicated to all individuals involved in the activity. |
| Hand tool usage | • Daily inspections will be performed;<br>• Remove broken or damaged tools from service;<br>• Use the tool for its intended purpose; and<br>• Use in accordance with manufacturer instructions. |

| HAZARDS | CONTROL MEASURES |
|---|---|
| Vehicular Traffic | • Spotters will be used when backing up trucks and heavy equipment and when moving equipment. |
| Overhead Hazards | • Personnel will be required to wear hard hats that meet ANSI Standard Z89.1;<br>• All ground personnel will stay clear of suspended loads;<br>• All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and<br>• All overhead hazards will be identified prior to commencing work operations. |
| Utilities | • Prior to any intrusive activities and every 45 days, utility markouts will be performed using New York One Call to identify the locations of utilities in the site area. |
| Dropped Objects | • Boots meeting ANSI Standard Z41 will be worn. |
| Eye Injuries | • Safety glasses meeting ANSI Standard Z87 will be worn. |
| Cave-in | • Ensure that cuts are sloped at a 1 ½ : 1 ratio;<br>• If Laborers are to enter the excavation, ensure that ladders are accessible at no more than 25' from every area of the excavation. Ensure proper ladders are used (extension ladders); ensure they are inspected for deficiencies; ensure that extension ladders extend 3' above the landing and are placed on a stable surface when accessing/exiting the excavation;<br>• Ideally, any excavation with ample space on one side of the cut will contain a ramp on one side for access and egress that is at an angle of 30°; and<br>• Laborers will not be permitted to enter any excavation which contains standing water. |
| Electrocution | • Equipment will be equipped with GFCI;<br>• All electrical work will be conducted by a licensed electrician;<br>• All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV. |
| Pinch/Cut/Smash | • Cut resistant Kevlar work gloves will be worn when dealing with sharp objects;<br>• All hand and power tools will be maintained in safe condition; and<br>• Guards will be kept in place while using hand and power tools. |
| Rigging | • Proper rigging techniques must be used at all times;<br>• Ensure that **inspections** of all rigging components are completed prior to use. Any components found to be defective or in less than optimal condition will be removed from service before commencement of operation;<br>• Make sure the appropriate PPE is utilized (especially gloves to guard against abrasions and lacerations); and |

| HAZARDS | CONTROL MEASURES |
|---|---|
| | • Rigging must be rated for lift, do not exceed load capacities.<br>• Only qualified personnel can participate in rigging activities. |
| Welding and Burning | • Keep work area clear of debris and garbage which could ignite from sparks<br>• Complete hot work permit and gain approval from SSO<br>• Have fire watch with fire extinguisher |
| Biological hazards | • Be alert to the presence of biological hazards;<br>• Wear insect repellent;<br>• Follow procedures in Section 4.2.3 for tick bites; and<br>• PM should be aware of on-site personnel with allergic reactions to insect bites and stings. A medical fact sheet will be held onsite by the SSO in the personnel files. |

**Phase of Work:** Excavation and Backfilling

**Tasks:** Benching for slope protection in the excavation areas, Protect and support excavation areas in proximity to overhead and underground utilities, Excavation of materials (contaminated and non-contaminated), Staging and stockpiling materials (contaminated and non-contaminated), Removal of subsurface obstructions, and Backfill and compaction of excavation areas.

| HAZARDS | CONTROL MEASURES |
|---|---|
| Chemical | • Wear appropriate PPE;<br>• Perform air monitoring per Tables 6-1;<br>• Practice contamination avoidance;<br>• Follow proper decontamination procedures; and<br>• Wash hands/face before eating, drinking, or smoking. |
| Slips/trips/falls | • Maintain alertness to slip/trip/fall hazards;<br>• Maintain good housekeeping;<br>• Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas;<br>• Walk, do not run; and<br>• Wear footwear with soles that grip. |
| Temperature extremes | • Drink plenty of fluids;<br>• Train personnel of signs/symptoms of heat/cold stress;<br>• Monitor air temperatures when extreme weather conditions are present;<br>• Stay in visual and verbal contact with your buddy; and<br>• Use Cold Stess and Heat Stress Programs (Appendix C & D). |
| Steam, Heat Splashing | • Use face shield and safety glasses or goggles;<br>• Stay out of the splash/steam radius;<br>• Do not direct steam at anyone;<br>• Do not hold objects with your foot or hands and steam area near it;<br>• Ensure that direction of spray minimizes spread of constituents of concern;<br>• Use shielding as necessary;<br>• Pressure washer will be equipped with a dead man's switch; and<br>• Use wand extenders. |
| Back injuries | • Follow proper lifting techniques: lift with legs, keep load close to the body, do not bend or twist with load, test load prior to lift, get help for heavy or awkward loads, clear path;<br>• Site personnel will be instructed on proper lifting techniques;<br>• Mechanical devices should be used to reduce manual handling of materials; and<br>• Team lifting should be utilized if mechanical devices are no available. |
| Vehicular Traffic | • Spotters will be used when backing up trucks and heavy equipment |

| HAZARDS | CONTROL MEASURES |
|---|---|
| | and when moving equipment. |
| Overhead Hazards | • Personnel will be required to wear hard hats that meet ANSI Standard Z89.1;<br>• All ground personnel will stay clear of suspended loads;<br>• All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and<br>• All overhead hazards will be identified prior to commencing work operations. |
| Noise | • Ear plugs or ear muffs. |
| Eye Injuries | • Safety glasses meeting ANSI Standard Z87 will be worn. |
| Fire/Explosion | • ABC type fire extinguishers shall be readily available; and<br>• No smoking in work area. |
| Under Ground Utility Strike | • Perform test pits, soft dig, utility markouts prior to excavation<br>• Review corporate utility clearance procedures |
| Electrocution | • Equipment will be equipped with GFCI;<br>• All electrical work will be conducted by a licensed electrician; and<br>• All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV. |
| Pinch/Cut/Smash | • Cut resistant Kevlar work gloves will be worn when dealing with sharp objects;<br>• All hand and power tools will be maintained in safe condition; and<br>• Guards will be kept in place while using hand and power tools. |
| Biological hazards | • Be alert to the presence of biological hazards;<br>• Wear insect repellent;<br>• Follow procedures in Section 4.2.3 for tick bites; and<br>• PM should be aware of on-site personnel with allergic reactions of insect bites and stings. A medical fact sheet will be held onsite by the SSO in the personnel files. |
| Radiation | • Actively monitor for radiological activity in disturbed material;<br>• Minimization of hand-to-mouth contact in exclusion zone; and<br>• Wear appropriate PPE (work clothes, gloves, potentially chemical protective clothing) to guard effectively against alpha particles. |

# 5.0 PERSONAL PROTECTIVE EQUIPMENT

Specific information on the selection rationale for each activity and storange and maintenance of PPE an can be found in Section 4.0 and Appendix K - Personal Protective Equipment (PPE): Selection and Use. For the purposes of PPE selection, the SSO and PSD are considered competent persons, as defined by OSHA. The signatures on the front of the SSHASP constitute certification of the hazard assessment. For activities not identified in this SSHASP, the SSO or PSD will conduct the hazard assessment and select the PPE using the information provided in Appendix K. Prior to any upgrade or downgrade of PPE the Construction Manager will be notified. Instruction be given by the SSO on the proper selection of PPE and this will be followed-up by periodic field inspections.

## 5.1 PPE Requirements

At a minimum, it is mandatory for all persons entering the Site to wear a Hard Hat, High Visibility Vest, steel-toe work boots, hearing protection and ANSI approved eyewear. If levels of radiation are present, no matter how minor, gloves will be required to be worn for the activity to guard against alpha particle penetration and inadvertent particle accumulation on the hands, which can then enter the digestive tract once in contact with the mouth.

In addition, Posillico will provide its employees with PPE meeting the following standards:

- Personnel entering within *5 feet of any energized electrical equipment* OR entering within *10 feet of energized overhead electrical lines* OR working within *10 feet of equipment with electrical potential* that is within 10 feet of overhead lines (i.e. excavator bucket) must be wearing fire resistant clothing as is dictated through OSHA standards: "Apparel which meets the flame resistant clothing requirements of the American Society For Testing and Materials (ASTM) standard, ASTM F1506-1994, is acceptable under all flame and electric arc hazard conditions for compliance with the paragraph 1910.269(l)(6)(iii) standard." This includes long pants and long-sleeved shirts to provide protection from burns in the case of coming in contact with electrical arcing. Shirts will meet FR-1 (with 100% cotton undershirts) and pants will meet FR-2 protection.

Throughout the workday, real time monitoring using portable instrumentation will be performed by a qualified technician, as deemed so by the SSO, in order to identify potentially hazardous environments. If an elevated level of contaminant is encountered, appropriate upgrades to PPE will be made (following table 6-1 and Section 6.0 accordingly).

Based on the potential chemical and physical hazards on site, the following personal protective equipment will be used during all work activities or as required depending on the task and hazard.

| | | |
|---|---|---|
| HEAD PROTECTION<br>HH = Hard Hat<br><br>HEARING PROTECTION<br>EP = ear plugs<br>EM = ear muffs | EYE/FACE PROTECTION<br>APR = Full Face Air Purifying Respirator<br>MFS = Mesh Face shield<br>PFS =Plastic Face shield<br>SG = ANSI approved safety glasses with side shields | FOOT PROTECTION<br>Neo = Neoprene<br>OB = Over boot<br>Poly = polyethylene coated boot<br>Rub = rubber slush boots<br>STB = Steel-toe leather work boots |
| HAND PROTECTION<br>Cot = cotton<br>But = Butyl<br>LWG = Leather Work Gloves<br>Neo = Neoprene<br>Nit = Nitrile | BODY PROTECTION<br>Cot Cov = Cotton Coveralls<br>Poly = Polyethylene coated tyvek coveralls<br>Saran = Saranex coated tyvek coveralls<br>Tyvek = Uncoated paper tyvek coveralls<br>WC = Work clothes<br>FP= Fire Protective | RESPIRATORY PROTECTION<br>Level D = No respiratory protection required<br>Level C = Full face air purifying respirator with approved cartridges<br>Level B = Full face air supplied respirator with escape bottle |

**TABLE 5-1**

**PERSONAL PROTECTIVE EQUIPMENT SELECTION**

| TASK | HEAD | EYE/FACE | FEET | HANDS | BODY | HEARING | RESPIRATOR |
|---|---|---|---|---|---|---|---|
| **Mobilization/Demobilization** | | | | | | | |
| Mobilization/ demobilization of equipment and supplies | HH | SG | OB | LWG | WC or FP as Required | EP as needed | Level D |
| Establishment of site security, work zones and staging area | HH | SG | STB | LWG | WC or FP as Required | EP as needed | Level D |
| Utility Connections | HH | SG | STB | LWG/ Nit | WC and/or FP/Poly as Required | EP as needed | Level D |
| Site Restoration | HH | SG | OB | LWG | WC or FP as Required | EP as needed | Level D |
| **Pre-Construction and Site Preparation** | | | | | | | |
| Delineate and Protect Utilities | HH | SG | STB | LWG | WC or FP as Required | EP as needed | Level D |
| Site Preparation | HH | SG | OB | LWG | WC or FP as Required | EP as needed | Level D |
| Clearing and Grubbing | HH | SG | OB | LWG | WC or FP as Required | EP as needed | Level D |
| Prepare | HH | SG | OB | LWG | WC or FP as | EP as needed | Level D |

| TASK | HEAD | EYE/FACE | FEET | HANDS | BODY | HEARING | RESPIRATOR |
|---|---|---|---|---|---|---|---|
| Decontamination Pad and Facilities | | | | | Required | | |
| **Sheet Pile Installation Activities** | | | | | | | |
| Welding/Sealing | HH | SG,PFS | STB | LWG | WC or FP as Required | | |
| **Construction Activities** | | | | | | | |
| Heavy equipment decontamination | HH | SG, PFS | OB | Nit | WC, Poly | EP as needed | Level D |
| Soil Excavation and Backfill | HH | SG | OB | Nit | WC, Poly | EP as needed | Level C or D Level B only if radiation encountered and cannot be mitigated any other way. |
| Support, Abandonment and Installation of Utilities | HH | SG | OB | LWG , Nit | WC and/or FP/Poly as Required | EP as needed | Level D |
| **Other Remediation Activities** | | | | | | | |
| Operations & Maintenance Tasks (Dewatering System) | HH | SG | OB | Nit, LWG | WC or FP as Required | EP as needed | Level D |
| **Soil and Groundwater Sampling Activities** | | | | | | | |
| Soil Borings and Sampling | HH | SG | OB | Nit, LWG | WC, tyvek, Poly or FP as Required | EP as needed | Level D |

*Level C PPE will only be used when VOC or mercury action levels are reached.

## 5.2 OSHA Requirements for Personal Protective Equipment

All personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

| Type of Protection | Regulation | Source |
|---|---|---|
| Eye and Face | 29 CFR 1910.133 | ANSI Z87.1-1968 |
| Respiratory | 29 CFR 1910.134 | ANSI Z88.1-1980 |
| Head | 29 CFR 1910.135 | ANSI Z89.1-1969 |
| Foot | 29 CFR 1910.136 | ANSI Z41.1-1967 |

ANSI = American National Standards Institute

## 5.3 Respiratory Protection Program

Any on-site personnel who have the potential to don a respirator must have a valid fit test certification and documentation of medical clearance. The SSO will maintain such

information on file for Posillico personnel, Posillico subcontractors, and other third party personnel. The SSO will obtain such information from the subcontractor's site supervisor prior to the initiation of any such work.

Both the respirator and cartridges specified for use must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.1025; 29 CFR 1910.134). Air purifying respirators cannot be worn under the following conditions:

- Oxygen deficiency;
- IDLH concentrations; and
- If contaminant levels exceed designated use concentrations.

In addition to the above requirements, a respiratory protection program has been developed in order to comply with 29 CFR 1910.134. The Posillico respiratory protection program is attached to this document as Appendix L.

It should be noted that if elevated levels of VOCs and Mercury are to be found simultaneously, the work area will be evacuated until one of, if not both of the levels can be lowered or dissipate. If the material does not dissipate or be lowered by any other means, employees will be equipped with Supplied Air respirators and upgrade to Level B PPE to complete the work.

### 5.4 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is, as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough (the wearer can smell or taste the chemical), whichever occurs first; and

- If the humidity exceeds 85% and average PID/FID readings exceed 10 ppm, then cartridges shall be removed and disposed of after 4 hours of use. The SSO will insure this information is communicated to all respirator users and will insure that the cartridges are changed within the required time period.

Respirators cartridges must be removed from the respirator at the end of the day and disposed. Respirators must be cleaned at the end of each day and placed in a respirator storage bag when dry. Respirators must be stored in a cool, dry location.

The schedule was developed based on the following scientific information and assumptions:

- Analytical data that is available regarding Site contaminants;

- Using the Rule of Thumb provided by the American Industrial Hygiene Association (AIHA);
- Total airborne concentration of contaminants is anticipated to be less than 100 ppm;
- The humidity is expected to be less than 85%; and
- Desorption of the contaminants (including those with poor warning properties, i.e. CO, H2S) after partial use of the chemical cartridge can occur after a short period (hours) without use (e.g., overnight) and result in a non-use exposure.

# 6.0 MONITORING

Qualified and trained personnel will perform environmental health and safety monitoring on site in accordance with this section.

This section only applies to monitoring workers and work zones for on-site activities and does not include community air monitoring which is covered in the site Perimeter Air Monitoring Plan (PAMP).

## 6.1 On-Site Monitoring During Remedial Activities

The type of onsite monitoring implemented will be appropriate for the activities performed. The following monitoring instruments will be available for use during field operation as necessary:

- Photoionization Detector (PID), Photovac Microtip with 10.6 eV lamp or equivalent; or
- Dust Meter, MIE Miniram model PDM-3 or equivalent;

The type of monitoring will be appropriate for the activities performed. All air monitoring equipment will be calibrated and maintained in accordance with manufacturer's requirements and the Monitoring Instruments: Use, Care, and Calibration program included in Appendix M.

Organic vapor concentrations, arsenic and lead, and radiation shall be measured logged and recorded using the PID/XRF/Ludlam meters during excavating and other intrusive activities In addition, the readings from all meters will be manually recorded (e.g. in a log book) for each 2-ft lift. In addition, monitoring personnel will make a best effort to collect organic vapor concentrations from downwind of the intrusive activity and monitoring will be continuous and readings will be averaged over a 15-minute period for comparison with the action levels given in Table 6-1.

A dust meter shall be used to measure, log and record airborne particulate matter during intrusive activities. Monitoring will be continuous and readings will be averaged over a 15-minute period for comparison with the action levels given in Table 6-1. In addition, PID readings will be manually recorded (e.g. in a log book) at least once every half hour. Monitoring personnel will make a best effort to collect dust-monitoring data from downwind of the intrusive activity. If off-site sources are considered to be the source of the measured dust, upwind readings will also be collected.

**TABLE 6-1**

**REAL TIME AIR MONITORING ACTION LEVELS**

| Air Monitoring Instrument | Monitoring Location | Action Level | Site Action | Reason |
|---|---|---|---|---|
| PID | Breathing Zone | 0.5 ppm | Use detector tube for benzene. If levels >1/2 PEL are encountered (taking into account the slow response time of Draeger tubes) personnel will exit work area until detector tubes confirm benzene levels are < 1/2 PEL. Benzene tubes will be sampled at initial detection of >1/2 PEL for 15 minutes and will be checked every 2 hours thereafter or until work activities change. | 1/2 of PEL for benzene |
| PID | Breathing Zone | 0 - 25 ppm | No respiratory protection is required if Benzene concentration is <0.5ppm | |
| | | 25 - 250 ppm | Level C | |
| | | > 250 ppm | Stop work, withdraw from work area; notify SSO. | |
| Oxygen meter | Breathing Zone | < 19.5% | Stop work; withdraw from work area; notify SSO. | Low oxygen |
| | | > 22% | Stop work; withdraw from work area; notify SSO. | Oxygen enriched atmosphere; explosion hazard |
| Carbon Monoxide | Breathing Zone | <10ppm | Continue work operations | |
| | | 10-35ppm | Stop work, ventilate area | |
| H2S meter | Breathing Zone | <5 ppm | No respiratory protection is required | |
| | | >5 ppm | Stop work, cover excavation, notify SSO | |
| Benzene | Work Area | <1 ppm | Continue work operations | |
| | | 1 ppm sustained for 15 minutes | Upgrade to level C | Short-term exposure limit (STEL) |
| | | >50 ppm sustained for work shift | Stop work – investigate source | |
| Hydrogen Cyanide | Breathing Zone | <5ppm | No Respiratory protection required | |

| Air Monitoring Instrument | Monitoring Location | Action Level | Site Action | Reason |
|---|---|---|---|---|
| (HCN) | | >5ppm | Stop work and notify SSO. Allow area to ventilate. Return to work after Level has dropped below 5 ppm. | |
| Combustible Gas Indicator (CGI) | Excavation | < 10 % LEL | Investigate possible causes, allow excavation to ventilate; use caution during procedures. | Increasing potential for ignition of vapors |
| | | > 10% LEL | Stop work; allow excavation, borehole to ventilate to < 10% LEL; if ventilation does not result in a decrease to < 10% LEL, withdraw from work area; notify SSO. | Potential for ignition of vapors |
| Dust Meter | Excavation | <0.3 mg/m$^3$ | Implement work practices to reduce/minimize airborne dust generation, e.g., spray/misting of soil with water | Potential inhalation source for airborne contaminants adhering to dust; Level is below established PEL |
| | | > 0.5 mg/m$^3$ | Upgrade to Level C PPE | PEL for arsenic |
| Jerome Mercury Monitor or similar | Hazardous Mercury Excavation | < 0.05 mg/m3 to 0.05 mg/m3 | No Action. Level D PPE | Level is well below PEL |
| | | 0.05 mg/m3 - 0.5 mg/m3 | Level C PPE | |
| | | 0.51 mg/m3 - 2.5 mg/m3 | Stop work and investigate. Alter work practices as necessary | Potential for over exposure to Mercury. |
| Individual Radiation Dosimiters or similar | Work Area Excavation | As Low As Reasonably Achievable <Background Level | Stop work and notify SSO. Use extreme caution while locating the source with Geiger Counter. Level B PPE upgrade may be necessary if radiation cannot be contained any other way. | Potential for over exposure to radiation |

*It should be noted that if elevated levels of VOCs and Mercury are to be found simultaneously, the work area will be evacuated until one of, if not both of the levels can be lowered or dissipate. If the material does not dissipate or be lowered by any other means, employees will be equipped with Supplied Air respirators and upgrade to Level B PPE to complete the work.

*Based on 15-minute average readings

## 6.2 Personal Air Monitoring

Posillico will perform personal air monitoring according to the OSHA general standards at the commencement of ground intrusive operations and throughout the remedial work for Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX), Napthalene, Hydrogen Cyanide (HCN), Hydrogen Sulfide (H2S), Polycyclic Aromatic Hydrocarbons (PAHs), Lead, Mercury and other Heavy Metals in order to verify the real time air monitoring results and to determine actual exposures. The results of the air monitoring will be compared to all applicable OSHA Permissible Exposure Limits (PELs).

Arsenic – 1926.1118 / 1910.1018(e) (1)
Determinations of airborne exposure levels shall be made from air samples that are representative of each employee's exposure to inorganic arsenic over an eight (8) hour period.

Lead - 1926.62(d) (1) (i)
Each employer who has a workplace or operation covered by this standard shall initially determine if any employee may be exposed to lead at or above the action level.

Benzene – 1926.1128 / 1910.1028(e) (1) (i)
Determinations of employee exposure shall be made from breathing zone air samples that are representative of each employee's average exposure to airborne benzene.

1910.1028(e) (1) (ii)
Representative 8-hour TWA employee exposures shall be determined on the basis of one sample or samples representing the full shift exposure for each job classification in each work area.

Employee exposure monitoring will be carried out in accordance with NOISH standardized methods. These methods specify quality assurance/quality control (QA/QC) provisions for maintaining sampling and analytical integrity, precision and accuracy. Samples will be analyzed by a laboratory accredited by the American Industrial Hygiene Association (AIHA).

## 6.3 Data Quality Assurance

### 6.3.1 Calibration

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages. All instruments shall be calibrated before each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm

individual instrument response. In the case of instrument failure, a backup instrument will be readily available to insure continuity in work.

#### 6.3.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SM for reference.

### 6.4 Noise Monitoring

Work areas or tasks that pose an exposure risk greater than 85 dBA will require hearing protection. If there is a reasonable possibility that workers may be exposed to an 8-hour time-weighted average exceeding 85 dBA, noise monitoring will be conducted by the SSO. All monitoring and surveillance equipment will be operated, maintained and calibrated in accordance with the manufacturer's instructions and the established quality assurance procedures. All equipment will be checked daily for proper operation. Field validation logs will be maintained on-site.

### 6.5 Temperature Extremes Monitoring

A cold stress prevention program will be implemented when ambient temperatures are below 50 F. Posillico's cold stress program can be found Appendix C.

A heat stress prevention program will be implemented when ambient temperatures exceed 70 F for personnel wearing impermeable clothing and for other personnel when the wet bulb globe thermometer (WBGT) index exceeds the ACGIH TLVs. Heat Stress monitoring will be conducted in accordance with the Heat Stress monitoring program found in Appendix D.

# 7.0 ZONES, PROTECTION, AND COMMUNICATION

## 7.1 Site Control

Site zones are intended to control the potential spread of contamination and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin for each task requiring such delineation (i.e. construction, excavation, trenching in impacted areas of the site).

Work zones will be clearly demarcated and well maintained. All zones will be identified by appropriate signage, caution tape, orange cones, orange fence or orange construction barrels. Maps will be available at the Site and used during initial site-specific training.

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 as required by Posillico. These records shall be maintained by the SSO, and copies will be provided to the PM prior to mobilization for project activities.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

***Support Zone*** - The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

***Contamination Reduction Zone*** - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for Exclusion Zone entry and egress in addition to access for heavy equipment and emergency support services.

***Exclusion Zone*** - All activities, which may involve exposure to site contaminants, hazardous materials and/or conditions, should be considered an exclusion zone. This zone will be clearly delineated by cones, tapes or other means. The PS may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site PS allowing adequate space for the activity to be completed, field members and emergency equipment.

## 7.2 Contamination Control

### 7.2.1 Decontamination Procedures

Personal and equipment decontamination will take place only in designated areas of the CRZ. Posillico will construct a decontamination area in order to contain all contaminated soils, sediments or water and used PPE. The area will be large enough to accommodate the equipment and personnel to be decontaminated.

Decontamination equipment may include the following:

- Wash Tubs
- Scrub Brushes
- Disposable Towels
- Seating to Facilitate Boot Cleaning
- Decontamination Solution
- Hand Soap
- Skin Wash Water Source
- Garbage Cans

### 7.2.2 Minimization of Contact With Contaminants

During completion of all site activities, personnel should attempt to minimize the degree of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and other physical contact with contamination. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control over spray and runoff and to ensure that unprotected personnel working nearby are not affected.

### 7.2.3 Personnel Decontamination Sequence

Consideration will be given to prevailing wind directions so that the decontamination line, the support zone, and contamination reduction zone exit is upwind from the exclusion zone and the first station of the decontamination line. Decontamination will be performed by removing all PPE used in EZ and placing in appropriate waste containers for disposal at the CRZ.

The following describes procedures to be employed for personal and equipment decontamination:

**PERSONAL DECONTAMINATION PROCEDURES FOR LEVEL D PROTECTION**

1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cool down stations may be set up within this area.

2. Scrub outer boot covers and gloves with decontamination solution or detergent/ water.

3. Remove outer gloves and deposit in waste container.

4. If clothing has become contaminated, remove it and place it into a poly bag.

5. Remove inner gloves and deposit in container with liner.

6. Wash hands and face if necessary.

7. Re-dress (as necessary) or put on clean clothes.

**PERSONAL DECONTAMINATION PROCEDURES FOR LEVEL C PROTECTION**

1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cool down stations may be set up within this area.

2. Scrub outer boot covers and gloves with decontamination solution or detergent/ water.

3. Rinse off decontamination solution from Step 2 (above).

4. Remove tape around boots and gloves and deposit in waste container.

5. Remove boot covers and deposit in waste container.

6. Remove outer gloves and deposit in waste container.

7. If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty.

8. Remove safety boots and place in area with plastic liner.

9. With assistance of helper, remove splash suit. Deposit in waste container.

10. Remove respirator. Deposit in container with plastic liner. Avoid touching face with fingers.

11. Remove inner gloves and deposit in waste container.

12. If inner clothing has become contaminated, remove it and place it into a poly bag.

13. Wash hands and face, if necessary.

14. Put on clean clothes.

Note: One to two laborers (the decontamination team) may be use to assist in the decontamination of workers exiting the exclusion zone

### 7.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination; wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment.

If the injured person can be moved, he/she will be moved to the exclusion zone boundary and decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury) provisions shall be made to ensure that emergency response personnel will be able to respond to victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with poly to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent chemical data.

### 7.2.5 Hand Held Equipment Decontamination

Hand held equipment includes all monitoring instruments, samples, and hand tools. The hand held equipment is dropped at the first decontamination station in the CRZ to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident.

Decontamination procedures for sampling equipment, hand tools, etc., shall include the use of steam cleaning or a detergent wash, as appropriate for the site conditions.

#### 7.2.6 Heavy Equipment Decontamination

Decontamination of chemically contaminated heavy equipment will be accomplished using high-pressure hoses or with brushes and shovels (dry decon) in the CRZ. Decontamination shall take place on a decontamination pad and all liquids used in the decontamination procedure will be collected. Vehicles or equipment brought into an exclusion zone will be treated as contaminated, and will be decontaminated prior to removal. All decontamination rinse water will be collected and passed through the water treatment system prior to discharge into the local sewer. Additional information on the decontamination of heavy equipment can be found in the Material handling Plan.

#### 7.2.7 Specific Procedures for Radiological Decontamination

Any areas (employee protective equipment, surveying equipment, tools, etc.) suspected to have come into contact with radiological material will be decontaminated using soap and water—washed, dried, and resurveyed to ensure that no radioactive material is lingering.

### 7.3 Communications

The following communications equipment shall be specified as appropriate:

- Telephones - A cellular telephone will be located in the SZ for communication with emergency support services/facilities and the home office. Personnel in the EZ can carry cellular telephones for communication as well if Level D PPE has been determined to be appropriate.

| Hand Signals - Hand signals shall be used by field teams along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Please note that these hand signals will be the only hand | **Meaning** |
|---|---|

| signals used for non task-specific work for the site. Typical hand signals are the following:**Signal** | |
|---|---|
| Hand gripping throat | Out of air, can't breathe |
| Grip on a partner's wrist or placement of both hands around a partner's waist | Leave area immediately, no debate |
| Hands on top of head | Need assistance |
| Thumbs up | Okay, I'm all right, I understand. |
| Thumbs down | No, negative. |

# 8.0 MEDICAL SURVEILLANCE PROCEDURES

All personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f) and, where applicable, expanded health standards.

## 8.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the SSO or PSD before a worker can enter the exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the PSD in consultation with the SSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance. In these cases, the employee will be taken to North Shore University Hospital at Glen Cove. The location and route to North Shore University Hospital at Glen Cove can be found in Appendix A.

# 9.0 DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal off site.

# 10.0 EMERGENCY RESPONSE / CONTINGENCY PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff are essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, and first aid for injuries incurred on-site, record keeping, and emergency site evacuation procedures. Emergency contact information, a list of key site personnel and hospital directions are included in this document in Appendix A.

## 10.1 Responsibilities

### 10.1.1 Site Safety Officer (SSO)

The SSO oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The SSO acts as a liaison to applicable regulatory agencies for safety-related issues and notifies OSHA of reportable accidents.

### 10.1.2 Project Manger (PM)

The PM is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The PM is responsible for performing head counts at the rall points after site evacuation. The PM is required to immediately notify the SSO and of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the SSO can notify OSHA within the required time frame. In addition, the Newport Project Manager will be notified verbally within 30 minutes of the incident.

### 10.1.3 Emergency Coordinator

The Site Safety Officer (SSO) is the primary Emergency Coordinator. In the event the SSO is not onsite or incapacitated, the Project Manager (PM) will act as the Emergency Coordinator.

In the event of an emergency, the Emergency Coordinator shall make contact with Local Emergency Response personnel. In these contacts, the Emergency Coordinator will inform response personnel about the nature of work on the Site, the type of contaminants and associated health or safety effects, and the nature of the emergency, particularly if it is related to exposure to contaminants.

The Emergency Coordinator shall review this plan and verify emergency phone numbers and identify hospital routes prior to beginning work on Site. The

Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator shall implement the Emergency Response/Contingency Plan whenever conditions at the Site warrant such action.

#### 10.1.4 Site Personnel

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a Site emergency.

### 10.2 Communications

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

The primary form of communication during an emergency between field groups in the exclusion zone and the Emergency Coordinator will be verbal communications. During an emergency situation, radio frequency communication lines will be kept clear so that all field teams can receive instructions.

#### 10.2.1 Telephone/Radio Communications

A cellular telephone or landline telephone will be available on-site as well as 2-way radio.

#### 10.2.2 Air Horns

Air horns will be used to alert Site personnel of emergencies. The following signals will be used:

- Two short blasts – shut down equipment, await instructions
- Three short blasts – site evacuation
- One continuous blast – injured employee, first-aid providers respond

#### 10.2.3 Hand Signals

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 7.3.

## 10.3 Pre-Emergency Planning

Before the field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency.

In order to be able to deal with any emergency that might occur during remedial activities at the Site, emergency telephone numbers will be readily available in the PS vehicle. These telephone numbers are presented in the Site Specific Emergency Contact Information attached in Appendix A. Hospital route maps and MSDS sheets will also be readily available in a separate binder at the Construction Office.

## 10.4 Emergency Medical Treatment

The procedures and rules in this SSHASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it shall be reported to the PM immediately. The PM must inform the owner's representative immediately and the Project Manager within 30 minutes of the injury. First-aid equipment will be available on-site.

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that have been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, shall be followed closely.

## 10.5 Non-Emergency Medical Treatment

The procedures and rules in this SSHASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it shall be reported to the PM immediately. The PM must inform the owner's representative immediately. First-aid equipment will be available on-site.

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that have been set up. Injured personnel that do not require immediate emergency medical attention but require more care than can be provided by a first aid kit, will be directed to a walk in medical clinic located nearby the site. The name, location and directions of the Posillico approved walk in medical clinic are listed in Appendix A.

## 10.6 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs at the work area, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas. The rally point will be located directly across the street from the Site. Signs will be posted in the SSO and PM vehicles and in the decontamination trailer to indicate where the rally point is located.

If any task covered under this SSHASP has the potential for significant hazards, evacuation drills will be performed as deemed necessary by the PM, SSO and PSD. Additionally an evacuation drill will be performed prior to project startup and quarterly thereafter. Drills may be announced or unannounced.

## 10.7 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the work area. The Emergency Coordinator will then immediately notify the local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- No smoking in the exclusion zone or any work area.
- No hot work without a properly executed hot work permit.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.
- Fire extinguishers will be selected and positioned based on the potential type and size

of fire that could occur in accordance with OSHA Construction Standard 29 CFR 1910.157(d)(1), e.g. Class A – 75 feet from work area, Class B – 50 feet from work area.

- Monthly inspections of all fire extinguishers.

The person responsible for the maintenance of fire prevention and/or control equipment is the SSO. The person responsible for the control of fuel source hazards is the PS.

### 10.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet (MSDS) will be followed as necessary. If first aid or emergency medical treatment is necessary the Emergency Coordinator will contact the appropriate emergency facilities. A MSDS binder will be kept in the office trailer and in the Contamination Reduction Zone.

| | |
|---|---|
| SKIN AND EYE CONTACT: | Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs. |
| INHALATION: | Move to fresh air. Decontaminate and transport to hospital or local medical provider. |
| INGESTION: | Decontaminate and transport to emergency medical facility. |
| PUNCTURE WOUND OR LACERATION: | Decontaminate and transport to emergency medical facility. |

### 10.9 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or postponed. The PS, SSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away carefully. If the outer contaminated garments cannot be safely removed on site, a plastic barrier between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material, which could also cause

severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

## 10.10 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on-site with regularly scheduled inspections.

- Industrial first aid kit (2-24 piece kits at a minimum)
- Portable eye washes
- Water gel burn kit
- Fire extinguishers
- Spill Kits
- Harness and lanyards
- Stretcher
- Direct reading instruments (DRI)
- Air Horn

## 10.11 Emergency Rescue Procedures

A site emergency is considered to be an event that has or threatens to have a detrimental physical impact on facilities, people, or the environment and requires immediate action. The definition applies to work locations and employees as well as the people and property associated with contractors and the community.

### 10.11.1 Responsibilities

- The PM (Christopher Hurst) is responsible for the overall conduct of the emergency procedures. This includes maintaining an orderly succession of supervision; making necessary reports to all concerned parties; ensuring that the incidents are identified and corrected; and ensuring the injured personnel(with or without life threatening injuries) are escorted to a medical treatment by the PM or other supervisory personnel.

- The SSO (Marc Atamian) has the responsibility for ensuring that the provisions of the SSHASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection procedures. The SSO is also responsible for conducting site inspections on a regular basis to ensure emergency readiness. The SSO shall be notified of any on-site emergencies and shall ensure that the appropriate procedures are followed.

### 10.11.2 First Aid

- First Aid Kits are located in company vehicles, and the decontamination facility.
- First Aid and CPR trained personnel shall be identified and on site at all times.
- Trained Emergency Responders (Site Specific) shall be identified and on site at all times.
- Emergency eye wash stations, emergency shower, and backboard shall be located at the decontamination facility.
- Monitoring Instruments shall be made readily available for real time monitoring of the atmosphere.
- Fire Extinguishers shall be made readily available. Minimum 10 pound ABC rating.

### 10.11.3 Procedure for Reporting Emergencies

- If your work is involved in an emergency situation STOP WORK IMMEDIATELY!
- Do not enter an area that is not safe to do so. Make call to the local emergency responders.
- Do not pick up anything that you did not drop yourself.
- Ensure the safety of the area and follow coworkers from any imminent danger.
- Report the emergency to your immediate supervisor by word of mouth or phone if at all possible.
- Supervisors and trained responders control hazards as necessary.
- Ensure that injuries are being cared for, assess the injury and seek assistance if necessary.

- Follow all decontamination procedures if injury and time allows.

- Secure the area and ensure that the area (scene) is not further disturbed.

- Position a point of contact at the gate to direct the Emergency responders to scene.

- Notify the LIRR Project Manager within 60 minutes of any emergency. Notification will be confirmed by direct contact, no voice mail. Where emergency measures exceed 60 minutes, the LIRR Project Manager shall be notified within 30 minutes of response needs being met.

- Provide a written report to the LIRR Project Manager within 24 hours.

- Any inquiries by the general public, news media or regulatory agencies will be referred to the LIRR Project Manager.

### 10.11.4 Personnel Injury

- The PS and or SSO shall ensure necessary first aid or medical attention is obtained. First aid shall be provided by qualified first aid providers or site Emergency Responders.

- For medical emergencies that are life threatening the appropriate community emergency services shall be notified and mobilized to the project site. The personnel within the EZ, regardless of level of PPE, will bring the injured person out of the EZ bypassing the decontamination procedures. The injured person will be ready at the CRZ for immediate evacuation by emergency personnel or local ambulance.

- For employees with less serious injuries, trained personnel are responsible for providing first aid care. In more severe cases, the field personnel at the scene will stabilize the injured person as much as possible with the EZ. Emergency response personnel will enter the EZ in appropriate PPE to conduct first aid and or remove the injured person for appropriate medical attention.

- If personnel are in need of medical evaluation, ensure that a safety officer or supervisor is assigned to escort the employee.

### 10.12 Accident/Incident Reporting

Incident reporting will be done following the guidelines established in the Incident Reporting Program in Section 4.0 of Posillico's Corporate HASP (Appendix E). Written confirmation of verbal reports shall be submitted within 24 hours.

In addition to the incident reporting procedures and actions described in the Corporate HASP, the PM will coordinate with the Engineer relative to reporting and notification for all environmental, safety, and other incidents. The Engineer will be notified within 60 minutes of any accident or incident (notification will be confirmed by direct contact, no voice mail). Furthermore, a written analysis will be generated and submitted within 24 hours of the accident or incident. If necessary, a site safety briefing will be held to discuss accidents/incidents and any findings from the investigation of the incident. The SSHASP will be modified if deemed necessary by the PSD and the SSO.

Additionally, near miss reporting will also be instituted on an as-needed basis. If a near miss occurs, a near-miss report will be completed. The results of the report will be discussed the following day during the morning safety huddle talk and during weekly project review meetings to prevent future near miss incidences from occurring.

### 10.13 Adverse Weather Conditions

In the event of adverse weather conditions, the PM, the SSO, and the Engineer will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The SSO and PM will determine

the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

### 10.14 Postings

The following information shall be posted or be readily visible and available at conspicuous locations throughout the site:

- Emergency telephone numbers
- Hospital Route Map
- OSHA Worker's Rights Posters

### 10.15 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers;
- Refilling medical supplies;
- Recharging eyewashes and/or showers;
- Replenishing spill control supplies; and
- Replacing used air horns.

### 10.16 Equipment Spill Requirements

Posillico will incorporate a Spill Response Kit to each site. The kit contains the proper supplies to effectively contain any petroleum release from any on-site heavy equipment (e.g. petroleum absorbent pads, Speedi-Dri, oil booms, etc.). In the event of a release, Posillico will utilize the supplies within the Spill Response Kit to contain the release and properly dispose of any saturated/contaminated cleanup materials within a 55-gallon drum or similar container. The container will then be properly disposed of. During the cleanup, Posillico site management will notify the Engineer of the spill and any pertinent details.

# 11.0 TRAINING

## 11.1 General Health and Safety Training

All Posillico site workers will be required to have received the 10 hour OSHA Construction Occupational Health and Safety training course. Supervisors will be required to have received the 30 hour OSHA Occupational Health and Safety training course.

## 11.2 Hazardous Waste Operations Training

In accordance with 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical). Proof of training shall be submitted to the SSO prior to the start of field activities.

## 11.3 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 29 CFR 1910.120 requirements and related company programs and procedures.

## 11.4 Supervisor Training

Personnel acting in a supervisory capacity shall have received 8 hours of instruction in addition to the initial 40 hours training.

## 11.5 Asbestos Awareness Training

Personnel capable of encountering asbestos-containing material (ACM) will receive an asbestos awareness training class prior to performing work on site.

## 11.6 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training (pre-work orientation) that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site, and will highlight all provisions contained within this SSHASP. This training will also allow field

workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity. Personnel that have not received site-specific training will not be allowed on-site.

### 11.7 Safety Meetings

For routine remediation tasks, a task-specific kick-off meeting to discuss safety issues will take place prior to starting fieldwork. This meeting will be held at an office location or occur in the field on the first day of work, depending on the complexity of issues to be discussed. Posillico will prepare and maintain documentation of these meetings.

Topics to be covered at these meetings will include:

- Safety plans and considerations for new job phases.
- Results of safety inspections.
- Review of accident history and the "Report of Accident/Incident" forms.
- Any applicable safety training.

Project personnel and visitors will be given both task-specific and general health and safety briefings daily by the SSO to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the crews on monitoring results. A copy of the Daily Safety Huddle form is provided Appendix N. This form or an equivalent must be used to document that these safety briefings are being held. All workers and site visitors will be required to sign this form after each daily safety meeting to acknowledge their attendance and understanding of the material presented. In addition, once a week a Tool Box Talk will be given to review job specific safety topics in further depth.

### 11.8 First Aid and CPR

The PM and SSO will identify individuals requiring first aid and CPR training in order to ensure that emergency medical treatment is available during all work shifts. The training will be consistent with the requirements of the American Red Cross Association or equivalent and will include training on blood borne pathogens.

### 11.9 Respirator Protection Training

In all areas of the site where respiratory protection is required, employees will be required to have completed annual respiratory use and care training. It is also necessary for the employee to meet the medical and fit testing requirements.

### 11.10 Emergency Evacuation Training

Emergency evacuation training is required for all employees on site in order to inform them of the site emergency evacuation procedure. Employees must know the routes of egress, detailed in Appendix A, as well as the designated assembly area.

### 11.11 Hazard Communication

Hazard communication training will be provided in accordance with the requirements contained in the Health and Safety Hazard Communication Program in Appendix B. The SSO will conduct the training onsite as required to ensure all site personnel are aware or chemicals onsite.

### 11.12 Confined Space Training

Posillico will provide training for all personnel whose duties involve entry, support, or supervision for confined space entry.

### 11.13 Benzene Training

Posillico shall provide employees with information and training at the time of their initial assignment to a work area where benzene is present. If exposures are above the action level, employees shall be provided with information and training at least annually thereafter.

# 12.0 QUALITY ASSURANCE (LOGS, REPORTS, AND RECORD KEEPING)

The following is a summary of required health and safety logs, reports, and record keeping. Posillico will maintain all copies of all required health and safety logs, reports and records on site during field activities.

## 12.1 Medical and Training Records

Copies or verification of training (40 hour, 8 hour, 10 hour, supervisor, and site-specific training) and medical clearance for hazardous waste site work and respirator use will be maintained by the SSO and copies provided to the PM prior to the initiation of work on-site. All records will be kept by the SSO on-site.

## 12.2 On-Site Log

A log of personnel on-site each day including visitors will be kept by the PM in a logbook or as individual sheets maintained in a file.

## 12.3 Safety Inspection Logs

Safety inspections will be conducted weekly by the SSO in order to maintain safe working conditions (Appendix O). The inspections will serve as a tool in identifying hazards and compliance issues that will be addressed. All deficiencies will be addressed and corrected by the field supervision. Inspection logs will be maintained in the job trailer for the duration of the project. The SSO inspection will include, but not limited to, equipment, ladders, scaffolds, fire prevention and protection, harness and lanyards, spill kits, first aid kits, excavation and shoring, material handling and storage, and PPE.

## 12.4 Safety Equipment List and Log

A safety equipment list/log will be maintained on site by the SSO to ensure that adequate safety equipment is maintained on site at all times. Inspections of safety equipment, such as the eye wash station, first aid supplies, and fire extinguishers, will be conducted and recorded.

## 12.5 Exposure Records

All personal monitoring results, laboratory reports, calculations and air sampling data sheets will be maintained by the PM during site work. At the end of the project they may be maintained in employee files if deemed necessary by the PM.

## 12.6 Accident/Incident Reports and Investigation

The incident reporting and investigation during site work will follow the Incident Reporting Program in Section 4.0 of the most recent edition of Posillico's Corporate HASP. Accident investigations will determine the cause of an accident so that a similar accident will not occur in the future. Posillico will determine the nature of the accident, record the findings and correct the cause.

Additionally, Posillico will actively participate in any Incident Analysis that may be required by Glen Cove IDA. Posillico will also make any subcontractor aware of this issue and they will be obligated to participate as well.

## 12.7 Hazard Communication Program

Material Safety Data Sheets (MSDSs) will be obtained for applicable substances and included in a separate MSDS binder. The hazard communication program will be maintained on-site in accordance with 29 CFR 1910.1200 and the Hazard Communication Program in Appendix B.

## 12.8 Safety Disciplinary Policy

Posillico Environmental believes that a safety and health Accident Prevention Program is unenforceable without some type of disciplinary policy. Our company believes that in order to maintain a safe and healthful workplace, the employees must be cognizant and aware of all company, State, and Federal safety and health regulations as they apply to the specific job duties required. The following disciplinary policy is in effect for Posillico employees and will be applied to all safety and health violations.

The following steps will be followed unless the seriousness of the violation would dictate going directly to Step 2 or Step 3.

1. A first time violation will be discussed orally between company supervision and the employee. This will be done as soon as possible.

2. A second time offense will be followed up in written form and a copy of this written documentation will be entered into the employee's personnel folder.

3. A third time violation will result in time off or possible termination, depending on the seriousness of the violation.

### 12.9 Work Permits

All work permits, including confined space entry, hot work, lockout/tagout permits will be maintained in the project files. Copies of all work permits shall also be provided to the Engineer.

### 12.10 Quality Assurance Process

Posillico will maintain a Quality assurance program for the duration of the project in order to ensure that the above noted forms and controls are being properly implemented and utilized. The quality assurance process will include the following:

- The SSO will discuss instances of non-compliance with the non-compliant party and the issue will be resolved within 24 hours;

- When the issue becomes resolved, proper documentation will be taken in order to prove that the issue has been closed out;

- The SSO will review the daily inspection forms weekly and for accurateness and to ensure that the issues have been resolved and closed out properly. Additionally, the SSO will review any related forms or permits (confined space, hot work, injury reports, MSDSs, chemical lists etc.) for accurateness. Delinquent items will be addressed as necessary; and

- The SSO will perform a weekly visual inspection of the site and including any areas/issues of non-compliance noted by the SR throughout the week.

- The PSD will perform periodic site safety audits to ensure all safety policies and procedures described in this SSHASP and in the most recent edition of the Posillico Corporate HASP are being followed.

## 13.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of this SSHASP for the site. It is maintained on-site by the PS as a project record. Each field team member shall sign this section after training in the contents of this SSHASP has been completed.

I have read, or have been informed of, the Health and Safety Plan and understand the information presented. I have also completed site-specific training for the work detailed in the project Work Plan. I will comply with the provisions contained therein.

| NAME (PRINT AND SIGN) | | EMPLOYEER | DATE |
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*APPENDIX A*

# SITE-SPECIFIC EMERGENCY INFORMATION

## EMERGENCY INFORMATION

The appropriate telephone numbers are listed below for medical emergencies.

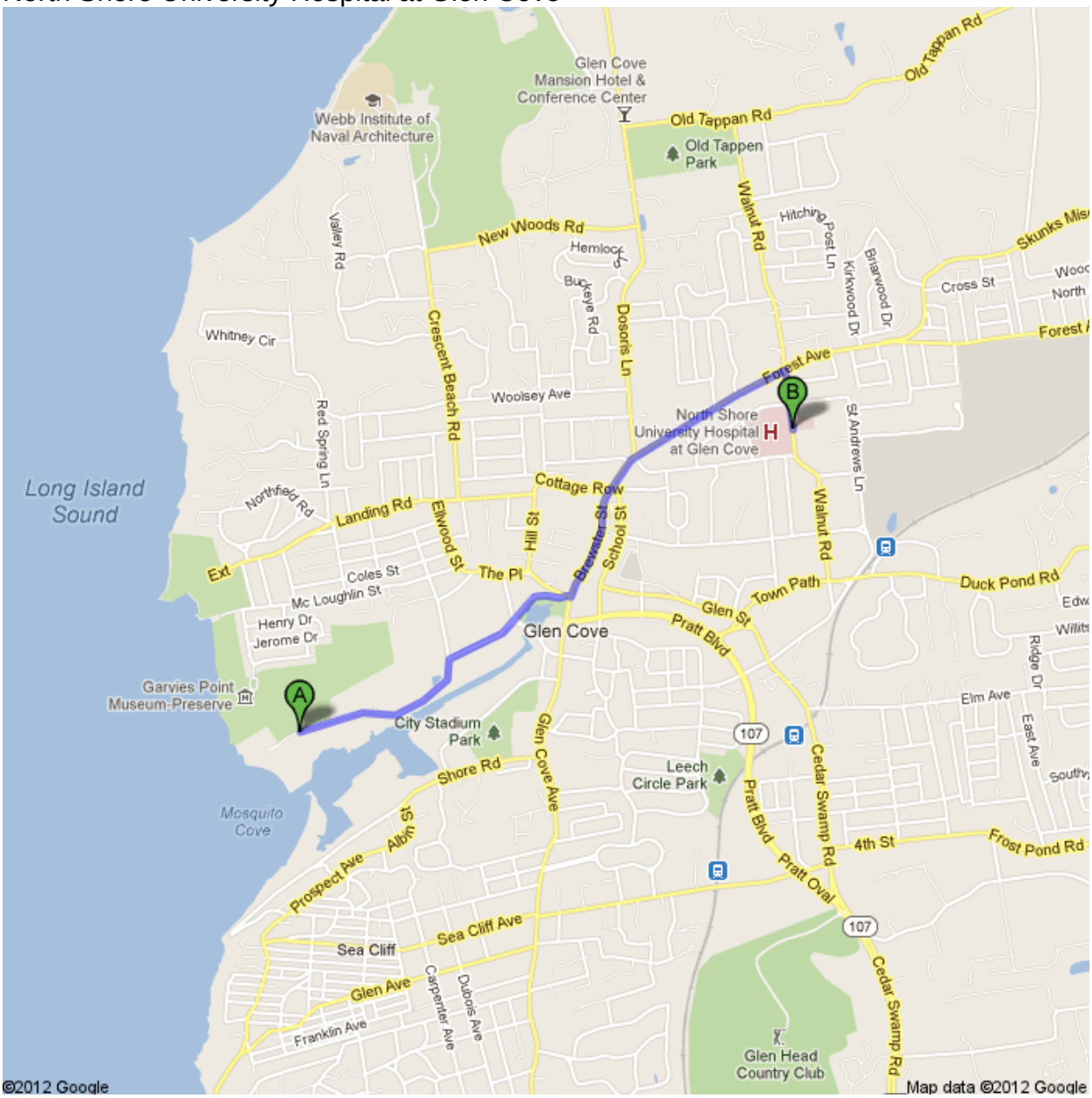
## ANY SERIOUS EMERGENCY - DIAL 911

Nearest Hospital to: 10 Garvies Point Road
North Shore University Hospital at Glen Cove
101 St. Andrews Lane
Glen Cove, NY 11542
(516) 674-7300

Other Emergency Numbers

| Agency | Contact | Phone Number |
|---|---|---|
| Police Emergency | | 911 |
| Fire Emergency | | 911 |
| Rescue Squad | | 911 |
| New York Poison Control | | (800) 222-1222 |
| Center for Disease Control | | (800) 311-3435 |
| D&B Project Manager | | |
| D&B Field Manager | | |
| Construction Contract Administrator | Erin Reilley | (516) 676-1625 x 107 |
| Posillico EHS Director | Paul McKinney | (516) 807-8077 |
| Posillico Project Manager | Christopher Hurst | (516) 523-0295 |
| Posillico Area Manager | Michael Perciballi | (516) 523-3945 |
| Posillico Foreman | Michael Rosato | (516) 903-6626 |
| Posillico Site Safety Officer/ Environmental Engineer | Marc Atamian | (516) 807-8016 |

North Shore University Hospital at Glen Cove




1. Head **northeast** on **Garvies Point Rd** toward **Charles St** go 0.5 mi
Total 0.5 mi

2. Take the 1st right onto **Charles St/Herb Hill Rd** - Continue to follow Herb Hill Rd go 0.4 mi
Total 1.0 mi

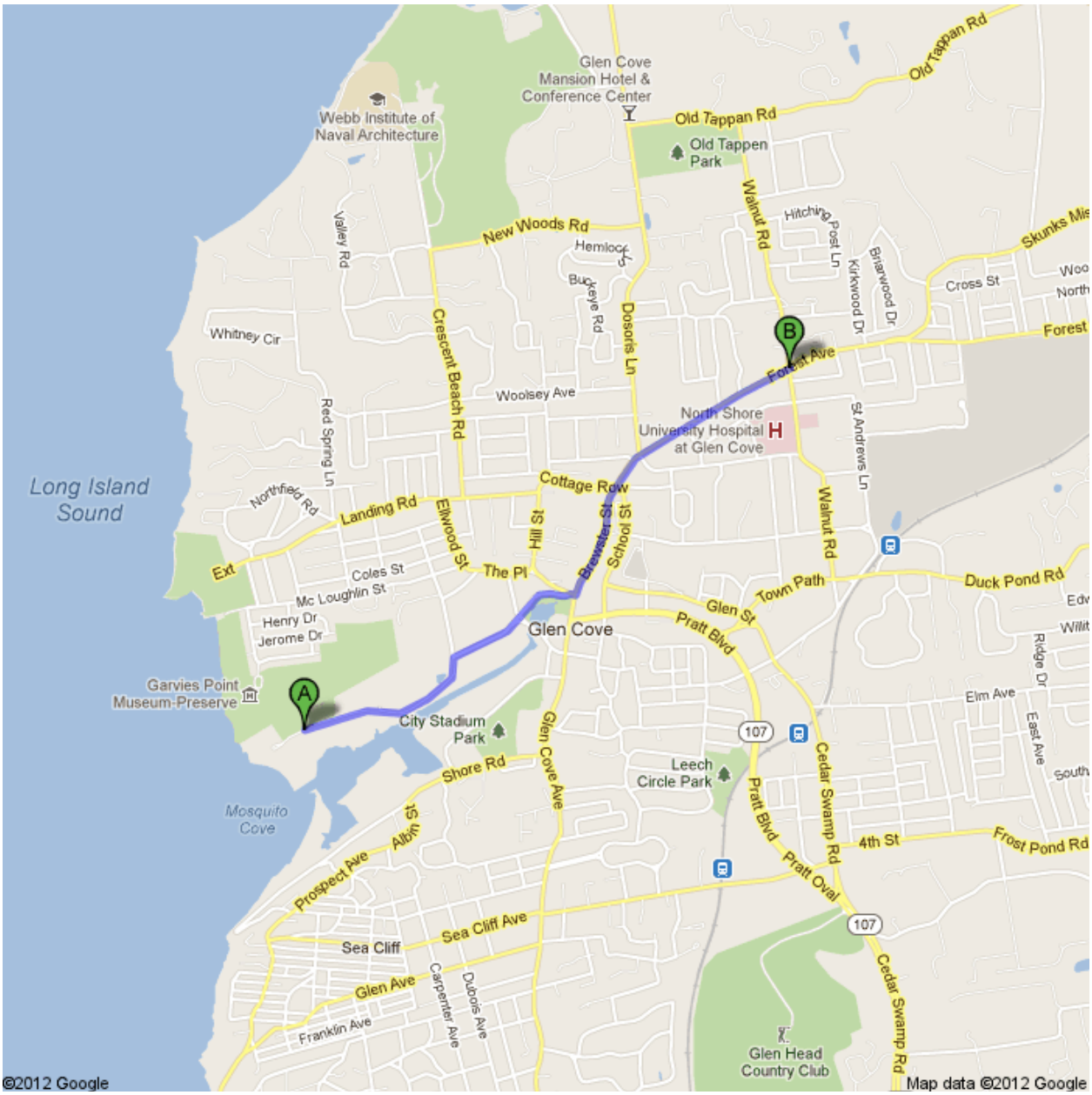
3. Turn left onto **Brewster St** go 0.3 mi
Total 1.3 mi

4. Continue onto **Forest Ave/School St** - Continue to follow Forest Ave go 0.6 mi
Total 1.9 mi

5. Turn right onto **Walnut Rd** - Destination will be on the right go 0.2 mi
Total 2.1 mi

**North Shore University Hospital at Glen Cove**
North Shore University Hospital at Glen Cove, 101 Saint Andrews Ln, Glen Cove, NY 11542 - (516) 674-7300

Glen Cove Med Station – First Aid Treatment




1. Head **northeast** on **Garvies Point Rd** toward **Charles St** go 0.5 mi
Total 0.5 mi

2. Take the 1st right onto **Charles St/Herb Hill Rd** - Continue to follow Herb Hill Rd go 0.4 mi
Total 1.0 mi

3. Turn left onto **Brewster St** go 0.3 mi
Total 1.3 mi

4. Continue onto **Forest Ave/School St** Continue to follow Forest Ave Destination will be on the right go 0.6 mi
Total 1.9 mi

Glen Cove Medical Center - 104 Forest Ave, Glen Cove, NY 11542
(516) 759-5406

*APPENDIX B*

# HAZARD COMMUNICATION PROGRAM

# Posillico Hazard Communication Program

## Introduction

The intent of the Hazard Communication Program is to provide employees with information about the potential health hazards from exposure to workplace chemicals in accordance with the OSHA Hazard Communication Standard promulgated on August 24, 1987. In order to accomplish its goal of transmitting this information to its employees, a written hazard communication program specifying how this goal will be achieved has been formulated. This document represents Posillico's Hazard Communication Program (HCP).

Employee participation is the key ingredient to the HCP. It is extremely important that employees not only follow the procedures, but also understand the reasoning. The Hazard Communication Program is an integral part of Posillico's effort to provide its employees with a healthy and safe workplace.

Although most Posillico field projects do not involve the use of hazardous substances it is imperative that all hazardous materials be managed in accordance with this program. This applies to any usage of hazardous materials regardless of volume. Each Office must maintain a copy of this program and review it with affected employees.

### *Purpose*

To make information available to employees concerning chemical hazards known to be present in the workplace (i.e., Posillico facilities or client locations) under normal conditions, or in a foreseeable emergency.

### *Scope*

This Hazard Communication Program (HCP) applies to any chemical obtained in excess of retail amounts known to be present in the workplace that employees may be exposed to under normal conditions of use, or may be exposed to in a foreseeable emergency. The HCP describes procedures for: determining chemical hazards in Posillico operations; providing training on chemical hazards to employees; and transmitting chemical hazard information through proper labeling and Material Safety Data Sheets (MSDSs). A master compilation of MSDSs is maintained at the Posillico Headquarters and copies of applicable MSDSs are maintained at each office. Field staff are responsible for keeping MSDSs for work performed at each job site. This inventory list is used to conduct annual inventory checks of Posillico’s stored chemicals.

## *Responsibilities*

## *The following individuals and groups are responsible for implementing the Hazard Communication Program (HCP).*

1. Health and Safety Assessment Division

    a. Provide general training to all new and existing employees as appropriate under the HCP. This training will include hazardous material monitoring and recognition, emergency response and understanding labels.

    b. Maintain documentation for HCP training, inform division/section managers of annual training requirements.

    c. Periodically update and review Hazard Communication Program.

    d. Maintain file of current MSDSs and arrange for retention of all obsolete MSDSs.

    e. Review operations with division/section managers to determine what jobs require HCP training.

    f. Obtain all missing MSDSs.

    g. Audit job sites and work areas for compliance with the HCP.

    h. Annually audit chemical listing to ensure that the most current MSDSs are on file and maintain a complete chemical inventory of chemicals in use.

    i. Act as liaison to outside authorities responding to chemical emergencies or conducting inspections to verify compliance with the HCP.

2. Department/Section Manager

    a. Inventory and compile listing of chemicals used in Department/Section annually and each job site.

    b. Provide specific training as appropriate for Department/Section/Client location.

    c. Notify H&S Division of any changes in operations that could affect the way hazardous chemicals are handled.

    d. Identify all jobs requiring the use or handling of hazardous chemicals.

    e. Notify H&S Division of employees requiring hazard specific training.

    f. Notify H&S Division when new hazards are presented.

    g. Ensure proper labeling procedures and MSDS review is being followed.

3. Employee

   a. Follow HCP procedures.

   b. Use PPE as instructed by training procedures.

   c. Inform division/section manager or H&S Division of:

      - Any symptoms of overexposure that may be related to handling hazardous chemicals.
      - Missing or inappropriate labels.
      - Missing or unavailable MSDSs.
      - Malfunctioning or unavailable safety equipment.
      - Read, understand and comply with information on labels and MSDSs.
      - Leave labels affixed to containers.
      - Use only approved containers for hazardous chemicals.
      - Know the location of emergency equipment on site and in the facility (if applicable).
      - Know your role in contingency plans.
      - Understand all changes in chemical handling and procedures.
      - Attend training sessions as scheduled.

4. Purchasing Department

   a. Request Material Safety Data Sheets (MSDS) from suppliers on each order of a chemical subject to this Program.

   b. Document the request for an MSDS on the purchase order.

## *Training*

1. General Training: Training on this program will be part of Posillico's annual refresher training or supplied on an as-needed basis.

   General training will consist of the following items:

   a. Requirement of OSHA HCS (29 CFR 1910.1200)

   b. Details of Posillico's HCP including:
      - Labeling
      - MSDSs
      - How employees can obtain and use appropriate hazard information.

   c. Detailed explanation on how to read and interpret an MSDS including:
      - Description
      - Sections
      - Explanations of each section
      - Usefulness of each section
      - Applicability of each section

2. Specific Training

   a. Listing of hazardous materials in each department/location/site.

   b. Location of MSDSs in each department/site.

   c. Written hazard evaluation procedures as referenced in Attachment A – Posillico Hazardous Chemical Label.

   d. Methods and observations to detect hazardous materials in the workplace, including:
      - Exposure monitoring
      - Continuous monitoring
      - Visual inspection
      - Odor
      - Other physical or unusual appearances

   e. Physical and health hazards of chemicals present in the workplace.

   f. Protection measures and procedures:

      - Appropriate work practices
      - Emergency procedures
      - PPE

   g. Field operations where hazardous chemicals are present.

Non-routine Tasks

Posillico typically uses low quantities of hazardous materials on job sites and in the laboratory. Posillico projects that involve large quantities of hazardous materials, extremely hazardous substances or exposure to a client's hazardous materials that are not on Posillico's inventory are to be reviewed on a case by case basis to determine the necessary training to safely work with these materials. Clients regulated under the Process Safety Management program require affected Posillico employees to attend the Client's site specific safety training program before being allowed access to the site. The Posillico Safety Department will provide training to employees when client training is not provided. All training will be documented and repeated as necessary. For example, Posillico does provide task specific training to DOT regulated employees for General Awareness, Shipping and Driving for workers involved in the shipping of hazardous materials and this training is provided every three years. Project Managers will notify the Safety Department when conducting non-routine tasks or when working with extremely hazardous substances in order to properly train employees before the project commences.

## *Training, Documentation*

1. Record names of attendee(s).
2. Request that employees initial by their names.
3. Complete training documentation form.
4. Submit copies to H&S Coordinator for employee training file.

## *Material Safety Data Sheets (MSDSS)*

1. MSDS Requirements

   a. An MSDS must be available for each hazardous material used in the workplace. A master compilation of MSDSs is maintained at the Posillico Headquarters and copies of applicable MSDSs are maintained at each site. Field staff is responsible for keeping MSDSs for work performed at each job site. Copies of MSDSs can be obtained by contacting the Safety Department. MSDSs for each office should be located near the area where hazardous materials are stored.

   b. The H&S Assessment Division will ensure that all MSDSs are complete, legible and in English. Employees that cannot read or understand English will be provided training as needed in a manner that the employee can understand.

   c. A file containing appropriate MSDSs for each Posillico facility will be readily available to all employees.

   d. A cover sheet will identify all MSDSs in the file – Attachment B.

   e. The H&S Assessment Division will audit the file.

   f. The Facility Manager will keep a master list of chemicals by department and listed alphabetically, by division.

   g. The H&S Assessment Division will distribute, to each department, new or updated MSDSs as they become available and make changes in the master list.

   h. Old MSDSs will remain on file permanently.

   i. MSDSs must be capable of being cross-referenced to their container labels, where appropriate.

   j. Where a process or group of hazardous chemicals presents a health hazard greater than or not indicated by the individual MSDSs, written operating procedures will also be provided or readily accessible. Standard operating procedures by the manufacturer, job descriptions, etc. may be useful for this information.

2. Procedure for Obtaining MSDSs

   a. The Purchasing Department will make an initial request for an MSDS from the manufacturer, either by phone, facsimile or mail. A copy of the request will be maintained with the name of the individual contacted and the date and included in the purchase order.

   b. Employees who are working at a manufacturing location should request a MSDS from the site contact for both raw materials and finished product.

   c. If MSDSs are not received within a reasonable time, approximately 30 days, the H&S Assessment Division or Facility Manager will send a second request to the manufacturer via certified mail, with a return receipt requested.

d. If, after the second request, no MSDS is sent, the H&S Assessment Division will contact the appropriate local OSHA area office by telephone, informing them of Posillico's inability to obtain an MSDS from the manufacturer.

e. The H&S Assessment Division will document the following information: date; name; title of OSHA contact; and, summary of conversation.

f. A copy of this information will be placed in the master file with the H&S Division for a 30-day period.

g. If the MSDS is not received or OSHA does not contact the H&S Assessment Division within 30 days, H&S Assessment Division will contact the local OSHA area office again.

h. If the MSDS is not received within 60 days, the H&S Assessment Division will contact the regional OSHA office.

3. Labeling

a. All manufacturers' labels will be left on containers.

b. All container labels will be legible, prominently displayed, and in English as well as any other prevalent language. Posillico will provide interpretation to employees who do not read or understand English when necessary.

c. Minimum label contents include chemical identity; appropriate hazard warnings; and the name and address of the manufacturer.

d. All labels must contain the information described in Attachment A. Posillico has generated a label for use when portable containers are poured off from the original container to a compatible unlabeled container for field, laboratory or facility use. This label should also be used for samples and mixtures suspected of containing hazardous materials. The appropriate MSDS will be referenced in order to complete the "Hazard Warning" portion of the label and determine if the chemical is compatible with the container in which it is being stored.

e. Posillico uses the International Air Transport Association/Department of Transportation Hazard Classification System for labeling hazardous material shipments by Posillico. Each office that ships hazardous materials must obtain appropriate labels for the shipment and transport of hazardous materials. Copies of the labels for the nine classes of hazardous materials are included in Attachment A.

4. Outside Contractors

a. Unless required by the nature of services to be provided, Posillico will attempt to restrict contractors from contact with hazardous chemicals on Posillico property or projects.

b. The Office Manager will notify the H&S Coordinator of all outside contractors on Posillico property or subcontracted to perform on Posillico projects.

c. The Project Manager will review the work and determine all hazardous chemicals to which the outside contractor's employees may be exposed.

d. The Project Manager will provide to the contractor a list of hazardous chemicals to which their employees may be exposed, and copies of corresponding MSDSs.

e. The Project Manager will inform the contractor of precautionary measures contained within the MSDS.

f. The Project Manager will inform the contractor of the labeling system used in the location of the contractor's work.

g. Records will be retained permanently with the H&S Coordinator.

5. References:

29 CFR 1910.1200, Hazard Communication.

OSHA Instruction CPL 2-2.38A, CH-1, July 18, 1986.

ACGIH, Threshold Limit Values and Biological Exposure Indices for 2004.

International Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, Supplement 7, pgs. 31-32, 41-46.

U.S. Department of Health and Human Services, Fifth Annual *Report on Carcinogens, Public Health Service, National Toxicology Program*, 1989.

Genium Publishing Corporation, MSDS Pocket Dictionary, August, 1988.

National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, June, 2002.

United States Department of Agriculture, Hazard Communication: A Program Guide for Federal Agencies; August, 1987.

**ATTACHMENT A**

**POSILLICO HAZARDOUS CHEMICAL LABEL**

HAZARDOUS CHEMICAL

IDENTITY: _____

HAZARD WARNING: _____

_____

MANUFACTURER:

ADDRESS: City _____ State _____

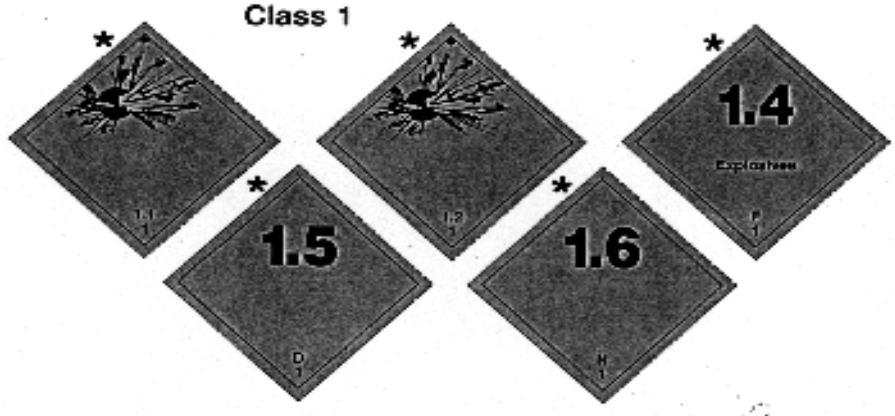
TELEPHONE: _____

# IATA/ICAO HAZARD AND HANDLING LABELS

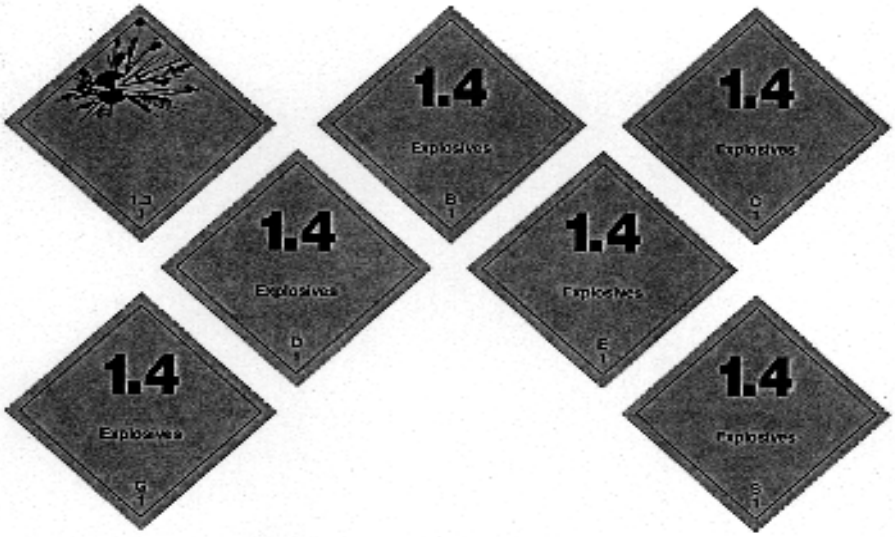
Except for Radioactive and Handling Labels, text indicating the nature of risk on label is optional.

## Primary hazard labels

### Class 1




* Articles bearing the Explosive labels shown above and falling into Divisions 1.1, 1.2, 1.4F, 1.5 and 1.6 are normally forbidden.




### Class 2

### Class 3

### Class 4

### Class 5

# IATA/ICAO HAZARD AND HANDLING LABELS (CONT.)

Except for Radioactive and Handling Labels, text indicating the nature of risk on label is optional.

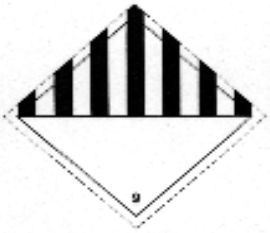
## Primary hazard labels (cont.)

### Class 6

### Class 7

### Class 8

### Class 9




## Secondary hazard labels

## Handling labels

# *APPENDIX C*

# Cold Stress

Posillico
STANDARD PRACTICE INSTRUCTION

SUBJECT
# Cold Stress

## 1. *Purpose and Introduction*
The purpose of this document is to educate the employee about exposure to cold environments and the effects of hypothermia and other cold-related injuries. Through proper use of Personal Protective Equipment (PPE), engineering and administrative controls; and education, cold injury, both to the extremities and the body's core temperature can be prevented.

## 2. *Scope*
This program is intended for use by employees engaged in work with the potential for exposure to cold environments. This program will be reviewed annually by the Health and Safety Department. Training will be provided annually to all those potentially affected, and will include this written program.

## 3. *Working in Cold Environments*

**Metabolic Responses**

The human body is designed to function best at a rectal temperature of 99-100F. The body maintains this temperature in two ways: by gaining heat from food and muscular work; or, by losing it through radiation and sweating. By constricting blood vessels of the skin and/or shivering, the body uses its first line of cold defense.

Temperature control of the body is better understood by dividing the body into two main parts: the shell; and, the core. The shell is comprised of the skin, capillaries, nerves, muscles and fat. Other internal organs such as the heart, lungs, brain and kidneys make up the core.

During exposure to cold, the skin is first affected. Blood in the peripheral capillaries is cooled, sending a signal to a portion of the brain called the hypothalamus. Regulating body temperature is one of the many basic body functions of the hypothalamus. Acting like a thermostat, adjustments are performed in order to maintain normal body temperatures. When a chill signal is received, two processes are begun by the hypothalamus: conserve heat already in the body; and, generate new heat.

Heat conservation is performed through constriction of the blood vessels in the skin (shell), thus reducing heat loss from the shell and acting as an insulator for the core. Sweat glands are also inhibited, thus preventing heat loss by evaporation.

Additional fuel for the body is provided in the form of glucose. Glucose causes the heart to beat faster, sending oxygen and glucose-rich blood to the tissue where needed. In an attempt to produce heat, the muscles rapidly contract. This process is better known as "shivering", and generates heat similarly to that created by strenuous activity, raising the body's metabolic rate.

During physical activity and fatigue, the body is more prone to heat loss. As exhaustion approaches, blood vessels can suddenly enlarge, resulting in rapid loss of heat. Exposure to extreme cold causes nerve pulses to be slowed, resulting in fumbling, sluggish and clumsy reactions.

### 4. *Cold Injuries*

Cold injuries are classified into two categories: local; or, general. Local injuries include frostbite, frostnip, chilblain and trenchfoot. General injuries include hypothermia and blood vessel abnormalities (genetically or chemically induced). Major factors contributing to cold injury are exposure to humidity and high winds; contact with wetness or metal; inadequate clothing; age; and, general health. Allergies, vascular disease, excessive smoking and/or drinking, and certain drugs and medicines are physical conditions that can compound the effects of exposure to a cold environment.

*a. Hypothermia*

Hypothermia is a condition of reduced body temperature. Most cases develop in air temperatures between 30-50°F, not taking windchill factor in consideration.

Symptoms of hypothermia are uncontrolled shivering and the sensation of cold. The heartbeat slows and sometimes becomes irregular, weakening the pulse and changing blood pressure. Changes in the body chemistry cause severe shaking or rigid muscles; vague or slow slurred speech; memory lapses; incoherence; and, drowsiness. Cool skin, slow irregular breathing, low blood pressure, apparent exhaustion, and fatigue after rest can be seen before complete collapse.

As the core temperature drops, the victim can become listless, confused, and make little or no effort to keep warm. Pain in the extremities can be the first warning of dangerous exposure to cold. Severe shivering must be taken as a sign of danger. At a core body temperature of about 85°F, serious problems develop due to significant drops in blood pressure, pulse rate and respiration. In some cases, the victim may die.

Sedative drugs and alcohol increase the risk of hypothermia. Sedative drugs interfere with the transmission of impulses to the brain. Alcohol dilates blood vessels near the skin's surface, increasing heat loss and lowering body temperature.

Table I, in Attachement A, provides information on the onset of hypothermia and metabolic responses at different body temperatures.

*b. Raynaud's Phenomenon*

Raynaud's Phenomenon is the abnormal constriction of the blood vessels of the fingers on exposure to cold temperatures, resulting in blanching of the ends of the fingers. Numbness, itching, tingling or a burning sensation may occur during related attacks. The disease is also associated with the use of vibrating hand tools in a condition sometimes called White Finger Disease. Persistent cold sensitivity, ulceration and amputations can occur in severe cases.

*c. Acrocyanosis*

Acrocyanosis is caused by exposure to the cold and reduces the level of hemoglobin in the blood, resulting in a slightly blue, purple or gray coloring of the hands and/or feet.

*d. Thromboangitis Obliterans*

Thromboangitis obliterans is clotting of the arteries due to inflammation and fibrosis of connective tissue surrounding medium-sized arteries and veins. This is one of the many disabling diseases that can also result from tobacco use. Gangrene of the affected limb often requires amputation.

*e. Frostbite*

Frostbite is the freezing of the body tissues due to exposure to extremely low temperatures, resulting in damage to and loss of tissue. Frostbite occurs because of inadequate circulation and/or insulation, resulting in freezing of fluids around the cells of the body tissues. Most vulnerable parts of the body are the nose, cheeks, ears, fingers and toes.

Frostbite can affect outer layers of skin or can include the tissues beneath. Damage can be serious, with permanent loss of movement in the affected parts, scarring, necrotic tissue, and amputation are all possibilities. Skin and nails that slough off can grow back.

The freezing point of the skin is about 30°F. As wind velocity increases, heat loss is greater and frostbite will set in more rapidly.

There are three (3) degrees of frostbite: first degree, freezing without blistering and peeling; second degree, freezing with blistering and peeling; and, third degree, freezing with death of skin tissues and possibly the deeper tissues.

The following are symptoms of frostbite:

i. Skin changes color to white or grayish-yellow, progresses to reddish-violet, and finally turns black as the tissue dies;

ii. Pain may be felt at first, but subsides;

iii. Blisters may appear;

iv. Affected part is cold and numb.

The first symptom of frostbite is usually an uncomfortable sensation of coldness followed by numbness. Tingling, stinging, cramping and aching feelings will be experienced by the victim. Frostbite of the outer layer of the skin has a waxy or whitish look and is firm to the touch. Cases of deep frostbite cause severe injury. The tissues are cold, pale and solid. The victim is often unaware of the frostbite until someone else observes these symptoms. It is therefore important to use the "buddy system" when working in cold environments, so that any symptoms of overexposure can be noted.

Table II, in Attachement A, describes the cooling power of wind on exposed flesh. This information can be used as a guide for determining equivalent chill temperatures when the wind is present in cold environments.

*f. Trench Foot and Chilblains*

Trench foot is swelling of the foot caused by long, continuous exposure to cold without freezing, combined with persistent dampness or immersion in water. Edema (swelling), tingling, itching and severe pain occurs, followed by blistering, necrotic tissue and ulcerations. Chilblains have similar symptoms as trench foot, except that other areas of the body are affected.

*g. Frostnip*

Frostnip occurs when the face or extremities are exposed to a cold wind, causing the skin to turn white.

### *5. Prevention of Cold Stress*

Cold Stress can be prevented through a combination of various factors: acclimation; water and salt displacement; medical screening, proper clothing selection; and, training and education. Through the use of engineering controls, work practices, work/rest schedules, environmental monitoring and consideration of the windchill temperature, the employee can be protected.

*a. Acclimation*

Acclimation can be achieved to some degree. Sufficient exposure to cold causes the body to undergo changes to increase comfort and reduce the risk of injury. But, these changes are minor and require repeated exposure to cold and uncomfortable temperatures to induce them.

*b. Dehydration*

The dryness of cold air causes the body to lose a significant amount of water through the skin and lungs. It is essential that caffeine-free, non-alcoholic beverages be available at the worksite for fluid replacement. Dehydration also increases the risk of injury due to cold and affects blood flow to the extremities.

*c. Diet*

A well-balanced diet is important for employees working in cold environments. Diets restricted only to certain foods may not provide the necessary elements for the body to withstand cold stress, leaving the worker vulnerable.

*d. Control Measures*

When the wind-chill factor results in an equivalent temperature of -26F, continuous exposure of the skin will not be permitted. Any worker exposed to temperatures of 36F or less who becomes immersed in water will be given dry clothing immediately and treated for hypothermia at the local hospital if any symptoms of

hypothermia are present. Notification of this incident will be provided to the Health and Safety Division immediately after sending the worker to the hospital.

*e. Engineering Controls*

The following are some ways that environmental controls can be used to reduce the effects of a cold environment:

i. General or spot heating should be used to increase temperature in certain areas in the workplace;

ii. Warm air jets, radiant heaters or contact warm plates can be used to warm the worker's hands if fine work is to be performed with bare hands for 10 to 20 minutes or more;

iii. Shield the work area if air velocity at the work site is increased by wind, draft or ventilating equipment;

iv. Metal handles of tools and control bars should be covered with thermal insulating material at temperatures below 30°F;

v. Unprotected metal chair seats will not be used in cold environments;

vi. When appropriate and feasible, equipment and processes will be substituted, isolated, relocated, or redesigned;

vii. Power tools, hoists, cranes or lifting aids will be used to reduce the metabolic workload;

viii. Heated warming shelters will be made available for continuous work being performed in an equivalent temperature of 20F or below. Workers will be encouraged to use the shelters regularly.

*f. Administrative Work Practice Controls*

Work practices and guidelines can be designed and developed to reduce exposure to cold stress. Some of these may include:

i. Work-rest schedules to reduce the peak of cold stress;

ii. Enforce scheduled breaks;

iii. Enforce intake of caffeine-free, non-alcoholic beverages;

iv. Schedule work that has potential exposure to cold stress for the warmest part of the day;

v. Move work to warmer areas, whenever possible;

vi. Assign extra workers for high-demand tasks;

vii. Provide relief workers for other workers needing breaks;

viii. Teach basic principles of recognizing and preventing cold stress;

ix. Use the buddy system for work at 10°F or below, and keep within eyeshot;

x. Allow new employees to adjust to the conditions before they work full-time in cold environments;

xi. Minimize sitting and standing in one place for long periods of time;

xii. Include weight and bulkiness of clothing when estimating work performance requirements and weights to be lifted.

Table III, in Attachment A, provides a work/warm-up schedule for cold environments, with wind chill taken into account.

*g. Special Considerations*

Older workers and workers with circulatory problems should be extra careful in cold environments. Sufficient sleep and good nutrition are important preventive measures for maintenance tolerance to the cold. Double shifts and overtime work should be avoided when working in cold environments.

If any of the following symptoms are observed on site, the affected worker will immediately go to warm shelter:

- Onset of heavy shivering;
- Frostnip;
- Feeling of excessive fatigue;
- Drowsiness;
- Euphoria.

After entering the warm shelter, the outer layer of clothing should be removed. If the clothing is wet from sweat and perspiration, dry clothing should be provided. If this is not feasible, then the clothing should be loosened to allow sweat to evaporate.

Anyone working in cold environments and on prescribed medication should consult their physician concerning any possible side effects due to cold stress. Those individuals suffering from diseases and/or taking medication that interferes with normal body temperature regulation or reduces the tolerance to cold will not be allowed to work in temperatures of 30F or below.

### *6. First Aid Measures for Cold Stress Exposure*

a. Call for emergency help. (i.e., Ambulance or Call 911)

b. Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.

c. Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.

d. Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. DO NOT rub the person's body or place them in a warm water bath. This may stop their heart.

### *7. Personal Protective Equipment (PPE)*

In choosing PPE for cold environments, it is important to maintain airspace between the body and outer layer of clothing to retain body heat. The more air pockets, the better the insulation. The clothing should also allow for the evaporation of sweat if the skin is wet.

The most important parts of the body to protect are the feet, hands, head and face. Hands and feet become cooled most easily, because of their distance from the heart. Keeping the head covered is equally important. As much as 40% of body heat loss is through the head when it is exposed.

Ideal clothing for exposure to cold environments is made of cotton. Cotton picks up sweat off the body and brings it to the surface. Loosely fitted clothing also aids in sweat evaporation. Recommended clothing may include the following:

a. Polypropylene under shirt and shorts under thermal underwear (preferably two-piece);
b. Wool socks;
c. Wool or thermal pants, lapped over boot tops to keep out snow and water;
d. Suspenders (belts can constrict and reduce circulation);
e. Insulated work boots, preferably waterproof. Safety toe, if necessary;
f. Wool or cotton shirt;
g. Parka;
h. Knit cap/hard hat liner;
i. Wool mittens or gloves (depending on the dexterity required);
j. Face mask or scarf.

Dirty or greasy clothing loses much of its insulation value. Dirty clothing crushes air pockets, allowing air to escape more easily. Also, denim is not a good protective fabric. It is loosely woven and allows water to penetrate and wind to blow away body heat.

**TABLE I**
**Progressive Clinical Presentation of Hypothermia***

| Core Temperature Deg. C | Deg. F | Clinical Signs |
|---|---|---|
| 37.6 | 99.6 | "Normal" rectal temperature. |
| 37 | 98.6 | "Normal" oral temperature. |
| 36 | 96.8 | Metabolic rate increases in an attempt to compensate for heat loss. |
| 35 | 95.0 | Maximum shivering. |
| 34 | 93.2 | Victim conscious and responsive, with normal blood pressure. |
| 33 | 91.4 | Severe hypothermia below this temperature. |
| 32 | 89.6 | Consciousness clouded; blood pressure becomes difficult to obtain; |
| 31 | 87.8 | pupils dilated but react to light; shivering ceases. |
| 30 | 86.0 | Progressive loss of consciousness; muscular rigidity increases; |
| 29 | 84.2 | pulse and blood pressure difficult to obtain; respiratory rate decreases. |
| 28 | 82.4 | Ventricular fibrillation possible with myocardial irritability. |
| 27 | 80.6 | Voluntary motion ceases; pupils non-reactive to light; deep tendon and superficial reflexes absent. |
| 26 | 78.8 | Victim seldom conscious. |
| 25 | 77.0 | Ventricular fibrillation may occur spontaneously. |
| 24 | 75.2 | Pulmonary edema. |
| 22 | 71.6 | Maximum risk of ventricular fibrillation. |
| 20 | 68.0 | Cardiac standstill. |
| 18 | 64.4 | Lowest accidental hypothermia victim to recover. |
| 17 | 62.6 | Isoelectric electroencephalogram. |
| 9 | 48.2 | Lowest artificially cooled hypothermia patient to recover. |

* Presentations approximately related to core temperature. Reprinted from the January 1982 issue of American Family Physician, published by the American Academy of Family Physicians.

**TABLE II**
**Cooling Power of Wind on Exposed Flesh as Equivalent Temperature (under calm conditions)***

| Estimated Wind Speed (mph) | Actual Temperature Reading (Degrees Fahrenheit) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **50** | **40** | **30** | **20** | **10** | **0** | **-10** | **-20** | **-30** | **-40** | **-50** | **-60** |
| | **Equivalent Chill Temperature ( □F)** | | | | | | | | | | | |
| Calm | 50 | 40 | 30 | 20 | 10 | 0 | -10 | -20 | -30 | -40 | -50 | -60 |
| 5 | 48 | 37 | 27 | 16 | 6 | -5 | -15 | -26 | -36 | -47 | -57 | -68 |
| 10 | 40 | 28 | 16 | 4 | -9 | -24 | -33 | -46 | -58 | -70 | -83 | -95 |
| 15 | 36 | 22 | 9 | -5 | -18 | -32 | -45 | -58 | -72 | -85 | -99 | -112 |
| 20 | 32 | 18 | 4 | -10 | -25 | -39 | -53 | -67 | -82 | -96 | -110 | -121 |
| 25 | 30 | 16 | 0 | -15 | -29 | -44 | -59 | -74 | -88 | -104 | -118 | -133 |
| 30 | 28 | 13 | -2 | -18 | -33 | -48 | -63 | -79 | -94 | -109 | -125 | -140 |
| 35 | 27 | 11 | -4 | -20 | -35 | -51 | -67 | -82 | -98 | -113 | -129 | -145 |
| 40 | 26 | 10 | -6 | -21 | -37 | -53 | -69 | -85 | -100 | -116 | -132 | -148 |
| (Wind speeds greater than 40 mph have little additional effect). | LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security. | | | | INCREASING DANGER Danger from freezing of exposed flesh within one minute. | | | GREAT DANGER Flesh may freeze within 30 seconds. | | | | |
| | Trenchfoot and immersion foot may occur at any point on this chart. | | | | | | | | | | | |

* Developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA

Note #1: Wind speeds greater than 40 mph have little additional effect.

Note #2: Trenchfoot and immersion foot may occur at any point on this chart

**TABLE III**
**Threshold Limit Values Work/Warm-up Schedule for 4 Hour Shift (*)**

| Air Temp.-Sunny Sky | | No Noticeable Wind | | 5 mph Wind | | 10 mph Wind | | 15 mph Wind | | 20 mph Wind | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **˚C (approx)** | **˚F (approx)** | **Max. Work Period** | **No. of Breaks** | **Max. Work Period** | **No. of Breaks** | **Max. Work Period** | **No. of Breaks** | **Max. Work Period** | **No. of Breaks** | **Max. Work Period** | **No. of Breaks** |
| -26˚ to -28˚ | -15˚ to -19˚ | (Norm. Breaks) | 1 | (Norm.Breaks) | 1 | 75 min. | 2 | 55 min. | 3 | 40 min. | 4 |
| -29˚ to -31˚ | -20˚ to -24˚ | (Norm. Breaks) | 1 | 75 min | 2 | 55 min. | 3 | 40 min. | 4 | 30 min. | 5 |
| -32˚ to -34˚ | -25˚ to -29˚ | 75 min | 2 | 55 min. | 3 | 40 min. | 4 | 30 min. | 5 | Non-emergency work should cease | |
| -35˚ to -37˚ | -30˚ to -34˚ | 55 min. | 3 | 40 min. | 4 | 30 min. | 5 | Non-emergency work should cease | | | |
| -38˚ to -39˚ | -35˚ to -39˚ | 40 min. | 4 | 30 min. | 5 | Non-emergency work should cease | | | | | |
| -40˚ to -42˚ | -40˚ to -44˚ | 30 min. | 5 | Non-emergency work should cease | | | | | | | |
| -43˚ & below | -45˚ & below | Non-emergency work should cease | | | | | | | | | |

Notes for TABLE III:

1. Schedule applies to moderate to heavy work activity with warm-up breaks of 10 minutes in a warm location. For light to moderate work (limited physical motion), apply the schedule one step lower. For example, at -30F with no noticeable wind (step 4, a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4 hour period.

2. The following is suggested as a guide for estimating wind velocity if accurate information is not available: 5 mph, light flag moves; 10 mph, light flag fully extended; 15 mph, raises newspaper sheet; 20 mph, blowing drifting snow.

3. If only the wind-chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind-chill cooling rate of about 17 W/m2; 2) all non-emergency work should have ceased at or before a wind-chill of 2250 W/m2. In general the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart over-compensates for the actual temperatures in the colder ranges, since windy conditions prevail at extremely low temperatures.

4. TLVs apply only for workers in dry clothing.

* Adapted from Occupational Health and Safety Division, Saskatchewan Department of Labor.

# *APPENDIX D*

# Heat Stress

Posillico
STANDARD PRACTICE INSTRUCTION

SUBJECT
# Heat Stress

## 1. *Purpose and Introduction*
The purpose of this document is to create an awareness among employees concerning the body's physiologic responses to heat; different types of heat stress that can affect the body; recognition of signs and symptoms; first aid treatment; and, preventive measures.

Heat stress is one of the most common (and potentially serious) illnesses at job sites. Although it is caused by a number of interacting factors, the wearing of PPE puts the worker at a much higher risk during warmer environmental conditions. The results of heat stress range from fatigue to serious illness or death. Through regular fluid replacement and other preventive measures, heat stress can be controlled, leading to increased efficiency and a higher level of safety on the job.

## 2. *Scope*
This program is intended for use by employees engaged in work with the potential for exposure to hot environments. This program will be reviewed annually by the Health and Safety Division. Training will be provided annually to all those potentially affected, and will include this written program.

## 3. *Source of Heat*

There are two sources of heat that are important to anyone working in a hot environment:

- Internally generated metabolic heat;
- Externally imposed environmental heat.

## 4. *Physiologic Responses to Heat*
The human body maintains a fairly constant internal temperature, even though it is exposed to varying environmental temperatures. To keep internal body temperatures within safe limits, the body must get rid of its excess heat, primarily through varying the rate and amount of blood circulation through the skin and the release of fluid onto the skin by the sweat glands. These automatic responses usually occur when the temperature of the blood exceeds 98.6°F and are kept in balance and controlled by the brain. In this process of lowering internal body temperature, the heart begins to pump more blood, blood vessels expand to accommodate the increased flow, and the microscopic blood vessels (capillaries) which thread through the upper layers of the skin begin to fill with blood. The blood circulates closer to the surface of the skin, and the excess heat is lost to the cooler environment.

If the heat loss from increased blood circulation through the skin is not adequate, the brain continues to sense overheating and signals the sweat glands in the skin to release large quantities of sweat onto the skin surface. Evaporation of sweat cools the skin, eliminating large quantities of heat from the body.

As environmental temperatures approach normal skin temperature, cooling of the body becomes more difficult. If air temperature is as warm as or warmer than the skin, blood brought to the body surface cannot lose its heat. Under these conditions, the heart continues to pump blood to the body surface, the sweat gland pour liquids containing electrolytes onto the surface of the skin, and the evaporation of the sweat becomes the principal effective means of maintaining a constant body temperature. Sweating does not cool the body unless the moisture is removed from the skin by evaporation. In high humidity, the evaporation of sweat from the skin is decreased and the body's efforts to maintain an acceptable body temperature may be significantly impaired. These conditions adversely affect an individual's ability to work in the hot environment. With so much blood going to the external surface of the body, relatively less goes to the active muscles, the brain, and other internal organs; strength declines; and fatigue occurs sooner than it would otherwise. Alertness and mental capacity also may be affected. Workers who must perform delicate or detailed work may find their accuracy suffering, and others may find their comprehension and retention of information lowered.

When temperature differences exist between two or more bodies, heat can be transferred. Net heat transfer is always from the body (or object) of higher temperature to that of lower temperature and occurs by one or more of the following mechanisms:

- **Conduction**. The transfer of heat from one point to another within the body, or from one body to another when both bodies are in physical contact. Conduction can be a localized source of discomfort from direct physical contact with a hot or cold surface, it is normally not a significant factor to total heat stress.

- **Convection**. The transfer of heat from one place to another by moving gas or liquid. Natural convection results from differences in density caused by temperature differences. Thus warm air is less dense than cool air.

- **Radiation**. The process by which energy, electromagnetic (visible and infrared), is transmitted through space without the presence or movement of matter in or through this space.

### *5. Predisposing Factors to Heat Stress*

Factors that may predispose an individual to heat stress vary according to the individual. These factors include:

- Lack of physical fitness;
- Lack of acclimatization;
- Age;
- Dehydration;
- Obesity;
- Drug/alcohol abuse;
- Infection;
- Sunburn;
- Diarrhea;
- Chronic disease.

Predisposing factors and an increased risk of excessive heat stress are both directly influenced by the type and amount of PPE worn. PPE adds weight and bulk, reduces the body's access to normal heat exchange mechanisms (evaporation, convection and radiation) and increases energy expenditure.

### *6. Forms of Heat Stress and First Aid*

(The following excerpts were taken from NIOSH Publication No. 86-112, Working in Hot Environments):

"Excessive exposure to a hot work environment can bring about a variety of heat-induced disorders. Among the most common are heat stroke, heat exhaustion, heat cramps, fainting and heat rash.

*a. Heat Stroke*

**Heat Stroke** is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

Individuals with signs or symptoms of heat stroke require immediate hospitalization. First aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment, at a medical facility, should be directed to the continuation of the cooling process and the monitoring of complications which often accompany heat stroke. Early recognition and treatment are the only means of preventing permanent brain damage or death.

*b. Heat Exhaustion*

**Heat Exhaustion** includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences weakness or fatigue, giddiness, nausea or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

*c. Heat Cramps*

**Heat cramps** are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large amounts of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly after, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs, or abdomen; but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth.

*d. Fainting*

**Fainting** occurs in workers not accustomed to hot environments and who stand erect and immobile in the heat.

With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain. Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

*e. Heat Rash (Prickly Heat)*

**Heat rash**, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not as easily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin."

### *7. Additional General First-Aid Measures for Heat Stress Exposure*

a. Call for Emergency help (ambulance or call 911).

b. Move the affected individual to a cool, shaded area.

c. Don’t leave the individual alone.

d. Remove any heavy or outer clothing.

e. Have the individual drink a small cup of cool water every 15 minutes, if they are able.

f. Try to cool the individual by fanning them.

g. Cool the skin with a cool spray / mist of water, wet cloth, or wet sheet.

h. If ice is available, place ice under the armpit and groin areas.

### *8. Selection of Personal Protective Equipment (PPE)*

During work periods where the increased risk of heat stress exists, each item's benefit will be carefully evaluated. Once the PPE is chosen, safe work durations/rest periods will be determined based on the following conditions:

- Anticipated work rate;
- Ambient temperature and humidity;
- Level of protection.

### *8. Prevention of Heat Stress*

Prevention of heat stress will be addressed in the following manner:

a. Adjustment of work schedules (See Attachment A).

i. Modify work/rest schedules.
ii. Enforce work slowdowns, as needed.
iii. Rotate personnel to minimize overstress or overexertion.
iv. When possible, work will be scheduled and performed during cooler hours.

b. Provide shelter or shaded areas to protect personnel during rest periods.

c. Maintain worker's body fluids at normal levels.

i. Drink approximately 12 to 16 ounces of non-caffeinated liquid (preferably water, Gatorade or equivalent) prior to the start of work. Caffeinated fluids act to dehydrate the worker.

ii. Workers will be urged to drink a cup or two every 15 to 20 minutes, or at each break. A total of 1 to 1.5 gallons of water per individual per day are recommended for fluid replacement under heat stress conditions, but more may be required.

d. Encourage physical fitness among the workers.

e. Gradually acclimatize workers on site to help build up an "immunity" to the conditions.

i. Heat acclimatization can usually be induced in 5 to 7 days of exposure at a hot job. For workers with previous experience with the job, acclimatization will include exposures of 50% for day 1, 60% for day 2, 80% for day 3, and 100% for the remaining additional days.

h. Provide cooling devices during prolonged work or severe heat exposure.

i. Supply field showers or hose down areas.
ii. Supply personnel with cooling jackets, vests, and suits.

i. Train workers in recognition and treatment of heat stress.

j. Use of the buddy system that depends on the recognition of signs and symptoms of heat stress.

k. Identification of heat-intolerant individuals through medical screening.

# ATTACHMENT A
# HEAT STRESS
# WORK / REST REGIMENTS AND MONITORING

## Introduction

Establishing a work/rest regimen that allows work to be completed in a timely manner while providing adequate rest time to prevent heat stress requires involvement of the ESS, FOL, and individuals involved. In many cases, particularly when wearing normal field type clothing (i.e., level D), awareness and communication are the key elements to a successful program. Allowing rest periods on an "as needed" basis while ensuring vigilance for initial symptoms of heat stress, encourages this success.

There are times when this approach is not appropriate. When heat stress contributing protective clothing (e.g., respirators, impermeable coveralls) are worn for extended periods, or when "as needed" work/rest regimens adversely impact either the individuals exposed to the heat source or work completion, a more formal work/rest regimen will be established.

Formal work/rest regimens are based on 1) monitoring ambient conditions (e.g., with a WBGT), estimating workloads and establishing work/rest times, 2) monitoring physiological conditions and adjusting work/rest periods, and 3) using personal heat stress monitors.

The WBGT, physiological monitors, and personal heat stress monitors will be used in accordance with manufacturer's instructions. Personnel heat stress monitors will be approved for use by the PESM.

## I. WBGT Based Work/Rest Regimens

### A. Work/Rest Regimens

The WBGT will be used in conjunction with the work load to determine the appropriate work/rest regimen for personnel wearing regular work clothing or semipermeable disposal coveralls (uncoated Tyvek). Light work examples include sitting or standing or performing light hand or arm work. Moderate work includes walking about with moderate lifting and pushing. Heavy work corresponds to pick and shovel-type work.

The work/rest regimen using the WBGT procedure will be used as a guideline. Table A-1 outlines the work/rest regimen guidelines based upon WBGT temperature and work load. Table A-2 identifies the correction factors. The WBGT temperature will be determined in accordance with Section B of this attachment.

**Table A-1.** Examples of Permissible Heat Exposure Threshold Limit Values.
(Values are given in ºF WBGT)*

| | | **Workload** | |
|---|---|---|---|
| **Work – Rest Regimen** | **Light** | **Moderate** | **Heavy** |
| Continuous Work | 86 | 80 | 77 |
| | | | |
| 75%Work - | 87 | 82 | 78 |
| 25% Rest, each hour | | | |
| | | | |
| 50% Work - | 89 | 85 | 82 |
| 50% Rest, each hour | | | |
| | | | |
| 25% Work - | 90 | 88 | 86 |
| 75% Rest, each hour | | | |

*Notes on Table B-1

1) These values are for fully acclimated workers wearing light weight pants and shirts. For conditions other than this use this table with the correction factors from Table B-2.

2) These values assume that workers drink frequently and have properly increased salting of food prior to exposure.

3) These values are guidelines. Actual levels may be modified based on individual physiological response and actual work and rest conditions.

4) These values assume that the rest location is cool enough to alleviate heat load conditions.

**Table A-2**. Correction Factors for Table B-1 in ºF*

| **Clothing Type** | **WBGT Correction** |
|---|---|
| Summer work uniform | 0 |
| Cotton overalls | -3.5 |
| Winter work uniform | -7 |
| Water barrier, permeable | -11 |
| | |
| **Condition** | **WBGT Correction** |
| Unacclimatized worker, moderate work load | -4.5 |

*To use this table, identify the most restrictive applicable clothing type and whether unacclimatized workers are involved. Add the two. Modify Table B-1 temperatures by this amount. For example, the Table B-1 TLV for continuous work, light workload is 86ºF. If cotton overalls (-3.5) are work and acclimatized workers are acclimatized (no additional change) the modified limit is 82.5ºF.

## B. WBGT Determination

If the Web Bulb Globe Temperature (WBGT) is used to determine if field conditions are conducive to heat stress, the WBGT is determined through the following equations:

(1)

Outdoors with solar load:

$$WBGT=0.7\ NWB+0.2GT+0.1DB$$

(2)

Indoors or outdoors with no solar load:

$$WBGT=0.7\ NWB+0.3GT$$

Where:

WGBT = Wet Bulb Globe Temperature Index
NWB = Natural Web-Bulb Temperature
DB = Dry-Bulb Temperature
GT = Globe Thermometer Temperature

The factors involved in the above equations can be measured in the following manner:

- Through the use of a direct-reading heat stress monitor capable of measuring all of the individual factors associated with the WBGT equation. For example, the Reuter-Strokes Wibet No. RSS-214 heat stress monitor.

- By measuring the individual factors manually using the following type of equipment

  Natural Wet-Bulb Temperature Thermometer
  Dry-Bulb Temperature Thermometer
  Globe Temperature Thermometer Stand

## II. Adjusted Temperature Based Work/Rest Regimens

When wearing impermeable protective clothing, the use of work/rest regimens based on WBGT is not recommended. The WBGT index is designed to account for the effects of evaporative cooling. Vapor barrier clothing impedes the evaporation of sweat and renders the WBGT an inappropriate physiological model. The most important environmental conditions related to heat stress for workers wearing impermeable protective clothing have been suggested to be the ambient dry bulb temperature and the radiant solar heat. These factors are combined into an index called the adjusted temperature using the following formula:

Tº adjusted = ambient dry bulb temperature + (13 x % sunshine)

where % sunshine is an estimate of the amount of time the sun is covered by clouds thick enough to product a shadow. The thermometer bulb should be shielded from radiant heat when taking measurements.

The adjusted temperature values are then used to determine the initial work/rest regimen and physiological monitoring frequency. Table B-3 gives the work period and monitoring frequency. Initially, rest periods will be at least 15 minutes. Physiological monitoring that is normally recommended is pulse rate and body temperature. Procedures for each are described below. Initially, both should be done. Pulse rate monitoring may be discontinued with the approval of the PESM if temperature monitoring proves to be effective.

## WORK/REST REGIMENS

### A. Pulse Rate Monitoring

When 70°F is reached, a baseline pulse will be recorded. Take the pulse immediately at the start of each rest period (P1). Take the pulse again 2 ½ to 3 minutes into the rest period (P2). If any of the following conditions exist, shorten the next work period by a third:

P1 > 110 beats per minute (bpm)
P2 > 90 pbm
P1 – P2 > 10 pbm

Pulse rates can be taken with an electric pulse meter, or manually with a stopwatch for 30-seconds.

### B. Body Temperature

When 70°F is reached, a baseline temperature will be recorded. Body temperature will be taken immediately at each start of the rest period. If the oral temperature exceeds 99.5° shorten the next work period by a third. Do not return the worker to hot work in semipermeable or impermeable clothing until the oral temperature is less than 99.5°F.

Oral temperatures may be taken with disposable oral thermometers or infrared ear drum scanners, such as the Thermoscan. Note: If a Thermoscan unit is purchased, the Pro Model should be selected. The home model available through drugstores cannot be recalibrated.

### C. Removal from Exposure

If an individual requires a shortening of the work period on more than two consecutive monitoring periods, or repeatedly over a few days, they should be removed from exposure to hot environments wearing semipermeable impermeable protective clothing until examined and cleared for such work by the consulting physician.

**Table B-3.** Initial Work Period and Physiological Monitoring Frequency [1]

| ADJUSTED TEMPERATURES | SCHEDULE |
|---|---|
| 90°F or above | 15 Minutes |
| 87.5° - 90°F | 30 Minutes |
| 82.5° - 87.5° | 60 Minutes |
| 77.5° - 82.5°F | 90 Minutes |
| 70° - 77.5°F | 120 Minutes |

[1] Schedule is for fit and acclimatized workers in impermeable protective clothing.

*APPENDIX E*

# POSILLICO CORPORATE HEALTH & SAFETY PLAN

Furnished upon request.

*APPENDIX F*

# HAND AND POWER TOOL USAGE

## *Purpose*

The purpose of this program is to establish safe work practices for the use of hand and power tools. Because we are reliant so heavily on this type of equipment and use it frequently, hand and power tools are the direct source of many injuries on our projects.

We must ensure our tools are used correctly, properly maintained and removed from service when no longer suitable for use.

Above all, only qualified and trained personnel will be permitted to use these tools.

## *Applicable Regulations*

OSHA 29 CFR 1926.300

## *Responsibilities*

### Project Management shall:

Purchase all hand and power tools according to company program specific to brand and model;

Ensure that all tools requiring guards are equipped as such before they are put into service on the job; and

Develop a procedure for the distribution of abrasive wheels for cutoff and chop saws.

### Employees shall:

Not remove any guard on a hand or power tool;

Inspect hand and power tools prior to use to ensure safe operating condition; and

Tag out, and report any damaged or defective tools to their foremen.

## *Procedural Overview*

### General Requirements

Maintain all hand and power tools and similar equipment in a safe condition;

When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use. Should the guard obstruct the work, it will not be removed;

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard;

Impact tools, such as drift pins, wedges and chisels, shall be kept free of mushroomed head; and

The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

## Power-Operated Hand Tools

Electric power operated tools shall either be the approved double-insulated type or effectively grounded;

Do not use a power tool with broken or defective insulation on the cord, broken or defective plugs, or loose or broken switches;

The use of electric cords for hoisting or lowering tools is not permitted; and

If the tool is provided with a side-mounted handle, it must remain on the tool to prevent wrist injuries should the tool bind during operation.

Trigger locks must be removed from grinders or made inoperable by a qualified person.

# *Powder Actuated Tools*

## Loading

Tools shall not be loaded until just prior to the intended firing time; and

The tool shall be tested each day before loading to see that the safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.

## Use

Use the lowest velocity on the tool until sufficient penetration is found;

Any tool found not in proper working order, or that develops a defect during use, will be immediately removed from service, tagged out and not used until properly repaired;

Neither loaded nor empty tools are to be pointed at any employees;

Keep hands clear of the open barrel end;

Do not leave loaded tools unattended;

Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile;

Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side;

No fastener shall be driven into a spalled area caused by a prior unsatisfactory fastening;

Tools shall not be used in an explosive or flammable atmosphere; and

All tools shall be used with the correct shield, guard, or attachment recommended or supplied by the manufacturer.

## Charge Storage

Live loads/cartridges must be stored in an approved, locked storage cabinet to meet applicable OSHA regulations. Pick up and dispose of unfired shots, do not throw explosive charges into trash containers or leave them lying around. Return them to your supervisor.

## PPE

Personal protective equipment, including eye, ear, head, and hand protection is to be worn by all tool operators.

## Training

Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool. Users shall possess a qualified operator's card that is issued by the manufacturer's representative.

# *Air Powered Tools*

## Hoses

Air hoses will be inspected prior to use looking for bends, kinks, or swelled areas. Hoses that are not in good condition shall be removed from service. DUCT TAPE IS NOT TO BE USED FOR REPAIRS;

Hoses used under compressed air conditions must be a reinforced wire braided type. Hoses used for water service may be standard airline hose;

Hoses will not be placed in access ways or across ladder passage. Where this is unavoidable, lines should be blocked over, or at least flagged;

Whip checks will be used on all airlines and tools to prevent against the hazards when uncoupling occurs. Whip checks shall be positioned on the hose rather than the fitting – if the hose should break, the fitting may stay connected while the hose will whip around; and

All air hose clamps must be crimped into place. Do not use worn gear clamps to attach couplings and fittings to air hoses.

Chicago or Air King type pneumatic fittings must be pinned.

## Use

Air powered tools should be oiled via in-line air oil;

Air powered tools and compressed air create certain health hazards where fine particles of dust, or chemicals are blown into the air. This air contamination should be eliminated by wetting agents, or exhaust ventilation;

Loose clothing, which can get caught in the moving parts of equipment, should not be worn while working with rotary tools;

Compressed air should not be used to clean off clothing. Air pressure against the skin can penetrate causing internal hemorrhaging and intense pain. Air that enters body openings can burst internal organs and lead to death;

When air powered tools create hazards to others, warning signs or placards shall be posted detailing the type of hazard(s) and direction for protection; and

Airlines must be turned off and bled of pressure before connecting/disconnecting an air tool, unless the connector is specifically designed for connection/disconnection under pressure.

## PPE

When silica or lead exposures are present when using air powered tools, use appropriate respiratory protection;

Demolition operations may require steel-toed boots and/or metatarsal protection; and

When performing any operation with an air powered tool that produces high vibration levels, carpal tunnel gloves should be used.

# *Abrasive Tools*

## Bench Grinders

Grinders shall be labeled with maximum operation R.P.M.;

Adjustable work rests shall be provided and kept at a distance not to exceed 1/8-inch from the surface of the wheel;

Objects that may kick back must be braced using a clamp or any device that securely holds objects prior to cutting;

Face shields shall be worn while using a bench grinder.

## Hand-held Grinders

Guards shall remain in place at all time, or the grinder is not to be used;

Trigger locks must be removed from grinders or made inoperable by a qualified person. A positive pressure switch shall be used;

Many grinders are supplied with handles designed to protect against wrist injuries, as well as support the tool. They shall not be removed, regardless if they interfere with the operation. A substitute tool should be considered;

Arbor on the grinding wheel must be the exact same size as the arbor shaft on the grinder;

Grinders shall be labeled with maximum R.P.M.;

Only abrasive wheels, which are compatible with the rated RPM, will be used;

A face shield must be used when using grinder plus safety glasses; and

When grinders with blades 7' or bigger are used, chaps will be required at the discretion of the Project Management.

## Abrasive Blades/Wheels

Only approved blades will be used;

Suitable Abrasive blades shall be used only on designated materials;

Only a qualified person shall mount blades per manufacturer's instructions;

Blades should be stored in a climate-controlled area (avoid freezing, extreme heat, or wet conditions);

Use blades only on designated tool (i.e., do not use chop saw blades on a cut-off saw);

Discard all abrasive blades with illegible/unreadable labels;

Fully inspect all blades prior to use;

The arbor hole should match the arbor of the tool, use only manufactured arbor adapters;

The RPM <u>of the wheel</u> shall equal or exceed the RPM of the tool;

Blades will be removed from the tool whenever, the tool is transported by vehicle, the tool is being stored, and the condition of the blade is suspect;

Allow newly mounted wheels to run at full RPM for at least 1-minute prior to use; and

Using the side of the "cutting" blade as a grinder is strictly prohibited.

## *Chainsaws*

### Equipment

When purchasing chain saws, always buy those with anti-kickback chains. Regular chains should be disposed of and replaced with anti-kickback chains. Anti-kickback chains are designed to skim the surface of the work in the event that the upper part of the chain comes into contact with the work. Older chains have a flat link between each of the raised cutters while newer chains have either a triple thick raker in front of each cutter or an extra raised section between cutters.

All chainsaws shall be equipped with a momentary finger contact or constant pressure "on/off" control switch that will shut off power when the pressure is released;

Chain rotation will stop when saw is in idle;

All saws must have spark-arresting mufflers; and

Electric chain saws shall be approved, double insulated, or effectively grounded.

### Inspection and Service

Equipment will be inspected before use for defects and broken or worn chains. Any chain saw that is broken or defective must be taken out of service, tagged and repaired immediately or removed from the job;

Chains shall be kept sharp, well lubricated and properly tensioned at all times. The chain needs sharpening when it must be pushed through to cut or when it throws sawdust rather than wood chips;

Chain saws shall be inspected before each day's use and during each refueling. Saws that are not in safe operating condition will not be used; and

If electric chainsaws are used, disconnect the power source from the chain saw before making any adjustments or repairs.

### Use

Do not walk with a running chainsaw;

Work "down" with the saw whenever possible;

If electric chainsaws are used, never use the cord to hoist or lower the tool;

Before refueling, saws must be cool to the point that spilled gas will not ignite;

Keep the air filter clean and use the correct mixture of fuel and oil;

Fully charged 20lb. ABC fire extinguishers shall be kept at all refueling areas;

Saws must be kept clean of excess oil to prevent slipping or fire hazards. Any spills that occur must be cleaned up immediately;

Chain saws will be carried or moved with the engine in the off position;

When starting a chain saw, place it on the ground, hold the handle with one hand and pull the starter with the other hand. Never start a saw by "drop starting" in the air, or on your leg;

Running saws must be gripped with both hands; and

Maintain a clear work area free of tripping hazards and obtain firm footing before commencing any work. Keep your weight balanced on both feet and do not over reach.

## Personal Protective Equipment

Employees using chain saws are exposed to flying debris, dust and noise. Kevlar fire resistant leg chaps, hard hats, safety glasses and face shields (mesh is acceptable), and gloves are required when working with chain saws. No loose or ragged clothing will be allowed. Additionally, effective hearing protection must be worn.

## Training

Always read and become familiar with the manufacturer's instructions before use; and

Operators shall be trained in the safe operation and maintenance of chain saws, proper tree falling procedures and the use of personal protective equipment.

# *Cut-Off Saws*

## Inspection

Ensure the guard is installed and functioning as intended by the manufacturer;

Handles are installed and functioning as intended by the manufacturer;

Trigger releases freely when released;

Muffler is installed;

Ensure no bolts are missing and all bolts are tight and functioning as intended by the manufacturer;

The pull cord handle is not broken or cracked;

The RPM of the tool is clearly marked on the tool;

The wheel flanges are clean and straight so the blade will spin true. The wheel flanges are recessed and are of the same diameter;

The wheel flanges are at least one-fourth the size of the blade;

The wheel arbor is the correct size for the blade. Never alter a wheel arbor to force a blade to fit the cut-off saw; and

If there is a blade in the tool, remove the blade and follow blade inspection guidelines.

## Personal Protective Equipment

Employees using cut-off saws will wear a hard hat mounted full-face shield in addition to safety glasses;

Proper, effective, hearing protection;

Proper protection from silica (see Silica Exposure Program);

Kevlar fire resistant leg chaps; and

Suitable, Leather work gloves.

## Abrasive Blade Storage

Store blades on a level and firm surface;

Do not subject the blades to heat, moisture, high humidity, rain or snow, freezing, or condensation;

It is recommended that blades be stored in a controlled atmosphere such as the project office or tool crib and that a blade distribution and inventory program be put in place;

Never transport the cut-off saw with the blade mounted; and

Remove blades after each use and if serviceable, return them to a proper storage area. Do not store the cut-off saw with the blade installed.

## Abrasive Blade Inspection

Do not use broken, cracked, warped, wet or otherwise damaged blades. Do not use blades if the blade label is unreadable;

Remove the blade from the cut-off saw for inspection. You can not properly inspect a blade while it is mounted; and

Check the maximum operating speed for the blade as indicated on the blade label. The blade's maximum rated RPM must be equal to or greater than the maximum RPM of the cut-off saw.

## Diamond Cutting Wheels

The manufacturer's instructions for use of diamond cutting wheels must be reviewed prior to installing the blade;

Following the minimum guidelines established for abrasive blades above to supplement the manufacturer's recommendations;

Diamond cutting wheels are intended for use when cutting concrete, masonry, architectural stones and granite, clay pipe and other materials only as recommended by the manufacturer;

Do not use diamond cutting wheels to cut metal or any other materials not recommended by the manufacturer;

Consider using water when cutting to eliminate silica exposure; and

Check the maximum operating speed for the blade as indicated on the blade label . The blade's maximum rated RPM must be equal to or greater than the maximum RPM of the cut-off saw.

## Fueling

Fuel the saw in a well-ventilated area, outdoors only;

Always shut the engine off and allow it to cool before refueling.

Relieve tank pressure by loosening the fuel cap slowly;

Always use a funnel and avoid over filling the tank;

Select bare-ground for fueling and move at least 10 feet from the fueling spot before starting the engine; and

Use the manufacturer's recommended fuel mix of oil and gasoline.

Have a suitable fire extinguisher ready for instant use.

## Starting Instruction

Do not drop start. Place the cut-off saw on level ground and have a firm grip on the handle to pull start the engine;

Never attempt to start a saw that is in a cut, as it may rebound; and

Position your body so that it is clear of the cutting attachment before pull starting. Adjust loose clothing to eliminate entanglement in the cutting attachment.

## Cutting Operations

Review and understand the job hazard analysis, (JHA), prior to using the cut-off saw;

Check that the wheel arbor matches the blade arbor speed;

Check that the blade's maximum RPM is equal to or greater than the maximum saw RPM. Select a blade specifically designed for use for the type of material you are going to cut;

Tighten the wheel flanges to secure the blade;

Allow the blade to spin freely at operating speed for at least one minute prior to use;

If you feel unusual vibration, stop the saw, determine the reason for the unusual condition, and correct he problem before using the saw again;

Maintain balance and solid footing while cutting. Do not over reach or position yourself in any way that could cause you to fall or lose control of the saw, particularly if the saw was to "kick back";

Adjust the guard to throw sparks away from your body. Remove any flammable items prior to beginning the cut, warn others near-by;

Do not attempt to cut anything above your shoulder height;

Let the tool do the work. Do not force the blade into the cut;

Make sure the blade has stopped spinning before letting go of the handles;

Carry the saw with the blade to the rear;

Do not transport the cut-off saw with the blade attached. Do not grind with the side of the cutting wheel. Inspect the tool and the blade before each use; and

When you are done with the cut-off saw, remove the blade and return the saw, blade and PPE to its designated storage area.

# *Chop Saws*

## General

Use only wheels designed for the saw (RPM rating on blade must meet or exceed that of the saw) and compatible with the material being cut;

Be sure to follow lock-out/tag-out procedures when changing wheels or performing any repairs; and

Do not remove the wheel guard.

## Cutting Operations

Make sure the tool is on a solid base and access to the tool is free of debris;

Use a vice to clamp/hold the work when necessary;

Never start the tool with a person directly in-line with the wheel, this includes the operator;

Do not cut masonry or wood with a chop saw, and only use correct blade for the item being cut;

Do not force the tool through the work; and

The saw should return to an open position after a cut. If it does not, the spring assembly may need repair.

*APPENDIX G*

# LINE BREAK PERMIT

# LINE BREAK PERMIT

☐ Contractor Name _____

☐ Subcontractor/Lower-tier Name (if applicable) _____

Project _____ Contract/PO/Release _____

Location (i.e., building, area, etc.) _____

Date of Line Break _____ Time _____

Service Being Broken _____ Line Number _____

Hazards (list all types of potential hazardous energy; also list all hazardous chemicals/material thought to ever have been in the line)

Special Instructions

## PROTECTIVE MEASURES

| Personal Protective Equipment Required | Check | | Date Complete | Other Protection Methods | Check | | Date Complete |
|---|---|---|---|---|---|---|---|
| | Yes | No | | | Yes | No | |
| Boots – Rubber | ☐ | ☐ | | Barricade – Radius (above/below) | ☐ | ☐ | |
| Coveralls – Cloth | ☐ | ☐ | | Blanks to be Installed | ☐ | ☐ | |
| Coveralls – Tyvek | ☐ | ☐ | | Block Valve Shut | ☐ | ☐ | |
| Dosimetry – Radiation (specify) | ☐ | ☐ | | Blower | ☐ | ☐ | |
| Film Badge – Chemical (specify) | ☐ | ☐ | | Fire Extinguisher | ☐ | ☐ | |
| Gloves – Leather | ☐ | ☐ | | Grating, Floor Opening Covered | ☐ | ☐ | |
| Gloves – Long | ☐ | ☐ | | Lockout/Tagout Required | ☐ | ☐ | |
| Gloves – Rubber | ☐ | ☐ | | Monitoring (specify) | ☐ | ☐ | |
| Goggles | ☐ | ☐ | | Nonsparking Tools | ☐ | ☐ | |
| Hood – Acid | ☐ | ☐ | | Piping Support Installed/Needed | ☐ | ☐ | |
| Respirator – Full Face | ☐ | ☐ | | Pump Locked Out | ☐ | ☐ | |
| Respirator – Half Face | ☐ | ☐ | | Spark Proof Tiles | ☐ | ☐ | |
| Respirator – Air Supplied | ☐ | ☐ | | Standby Person (required for first time breaks) | ☐ | ☐ | |
| Respirator – SCBA | ☐ | ☐ | | System Flushed | ☐ | ☐ | |
| Shield – Face | ☐ | ☐ | | System Less than 100 °C (212 °F) | ☐ | ☐ | |
| Shield – Special Shielding | ☐ | ☐ | | System Vented | ☐ | ☐ | |
| Suit – Acid | ☐ | ☐ | | Valve Locked Out | ☐ | ☐ | |
| Suit – Hot | ☐ | ☐ | | Ventilation – Exhaust | ☐ | ☐ | |
| Suit – Rain | ☐ | ☐ | | Ventilation – Dilution/General | ☐ | ☐ | |
| Other: | ☐ | ☐ | | Water Hose | ☐ | ☐ | |
| Other: | ☐ | ☐ | | Other: | ☐ | ☐ | |
| Other: | ☐ | ☐ | | Other: | ☐ | ☐ | |
| Other: | ☐ | ☐ | | Other: | ☐ | ☐ | |
| Other: | ☐ | ☐ | | Other: | ☐ | ☐ | |

# LINE BREAK PERMIT

| PLANNING ITEMS FOR LINE BREAKS | |
|---|---|
| 1. Fire Extinguisher Location | |
| 2. Planned Escape Route | |
| 3. Nearest Eyewash Location | |
| 4. Cold Pak Location | |
| 5. Scott Air Pak Location | |
| 6. Other | |
| 7. Other | |
| 8. Other | |
| 9. Other | |

| SIGNATURES | | | |
|---|---|---|---|
| Posillico Environmental Site Manager | Date | | Date |
| Subcontractor (if applicable) | Date | | Date |
| Health and Safety Supervisor | Date | | Date |

| RELAXING PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS | |
|---|---|
| Date | Time |
| Personal protective equipment reduced to items listed below following first line break (if applicable) | |

# PREJOB SAFETY PLANNING SIGNOFF

☐ AHA reviewed (check)

I have read the attached AHA (and attachments) and understand the hazards associated with this job.

☐ Prejob meeting – general ☐ Energized work permit prejob ☐ Fall protection work plan

☐ Hoisting & rigging prelift ☐ Confined space preentry briefing ☐ Asbestos work plan

☐ Other (specify): _____

Project Number _____ Project Location _____

| Date | ID No. | Name (Print) | Signature | Asbestos Work Plans Only | |
|---|---|---|---|---|---|
| | | | | Asbestos Cert No. and Expiration Date | Date Competent Person Assigned |
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*APPENDIX H*

# MOTORIZED VEHICLES AND EQUIPMENT

Motorized vehicles and equipment

1. Do not ride on motorized vehicles or equipment unless a proper seat is provided for each rider.

2. Always be seated when riding authorized vehicles (unless they are designed for standing).

3. Do not operate any motorized vehicle or equipment unless you are specifically authorized to do so by your supervisor.

4. Always use your seat belts in the correct manner.

5. Obey all speed limits and other traffic regulations.

6. Always be aware of pedestrians and give them the right-of-way.

7. Always inspect your vehicle or equipment before and after daily use.

8. Never mount or dismount any vehicles or equipment while they are still in motion.

9. Do not dismount any vehicle without first shutting down the engine, setting the parking brake and securing the load.

10. Do not allow other persons to ride the hook or block, dump box, forks, bucket or shovel of any equipment.

11. Each operator must be knowledgeable of all hand signals and obey them.

12. Each operator is responsible for the stability and security of his/her load.

13. Any accidents or damage must be reported to your supervisor immediately.

14. The Operator is responsible for the safe operation of the vehicle, machine or equipment they are operating.

15. Do not transport workers and tools in the same compartment, there must be a physical separation to prevent tools and supplies from sliding into or falling on workers.

16. Vehicles or equipment must be physically inspected before being placed into use.

*For other rules and regulations regarding motor vehicles, mechanized equipment and marine operations, please refer to OSHA construction Safety Standards..*

# Posillico | Equipment / Vehicle Inspection Checklist

Date: _____ Equipment / Vehicle #:_____

Job #: _____ Location: _____

Operator / Driver's Name (print): _____

| PRIOR TO USING MACHINE / VEHICLE INSPECT THESE ITEMS | | |
|---|---|---|
| **Item to Check** | **OK** | **Action Needed** |
| Corrections of the following defective items must be made as soon as possible, but you can still use the equipment / vehicle if defects in these items exist. | | |
| 1. Engine Oil | | |
| 2. Radiator Fluid Level | | |
| 3. Condition of Tires | | |
| 4. Undercarriage / Tracks | | |
| 5. Fire Extinguisher (if equipped) | | |
| 6. Cab Housekeeping and Condition | | |
| 7. Inspection and Registration | | |
| The following items are considered to be **CRITICAL SAFETY ITEMS**. No equipment / vehicles can be operated until defects present in any of the following items are repaired. | | |
| **8. Wheel Lug Nuts** | | |
| **9. Hydraulic Leaks** | | |
| **10. Seat Belts** | | |
| **11. Warning Lights / Buzzer** | | |
| **12. Cab Glass** | | |
| **13. Back-up Horn / Alarms** | | |
| **14. All Lights** | | |
| **15. System Air Pressure** | | |
| **16. Wipers** | | |
| **17. Parking Brake** | | |
| **18. Service Brakes** | | |
| **19. Other:** | | |

Has the Shop been notified of any items requiring repairs? ☐ Yes ☐ No

Additional Comments: _____

_____

# *APPENDIX I*

# *CONFINED SPACE AND HOT WORK*

# CONFINED SPACE/HOT WORK PERMITTING PROCEDURE

## 1.0 Introduction

Welding, cutting, brazing and other hot work operations are a necessary part of the industrial world, both in manufacturing and construction. Too often, the people who hire, use, or supervise the use of these processes don't understand the hazards behind them, which can result in loss of life, property, or both, by fire and explosion.

Any material that is combustible or flammable is susceptible to ignition by heat-producing activity. Common materials such as floors, partitions, roofs, wooden members, paper, textiles, plastics, chemicals, flammable liquids and gases, and grass or brush are very likely to become involved in fire during hot work operations if adequate precautions are not taken.

Hot work is any work that requires the use of tools/equipment that have the potential to produce temperatures which could reasonably be expected to ignite flammable/combustible material or atmospheres in the vicinity of the work area. These tools/equipment have the capability of producing sparks, open flames, heat, or an electrical arc during use. Hot work is not limited to just welding, cutting and brazing, but also grinding, sawing (metal to metal) and chipping operations.

Confined spaces are spaces that can be bodily entered but are not meant for human occupancy. Confined space hazards exist if the potential for hazardous or explosive atmospheres and/or oxygen deficient hazards exist. Other hazards that could exist include mechanical sources and falls. Two types of confined spaces exist: permit required and non-permit required.

## 2.0 Purpose

To provide Posillico employees and subcontractors, who oversee or perform hot work and confined space entry on projects, with a standard permitting and safety procedure to prevent injury or loss of life and property. To be used as a reference in instances where hot work/confined space entry is performed and as a permit procedure in instances where one is not available.

## 3.0 Scope

This procedure will apply to all Posillico employees and subcontractors who oversee or perform hot work on projects utilizing welding, cutting, brazing, grinding, chipping, portable heaters, and other potential heat-producing equipment for field/facility activities. This procedure is also to be followed for all confined space entry situations. This procedure will apply to all contractors or subcontractors working under Posillico that do not have an adequate Permitting Procedure in place with the company in which they are currently employed. All Posillico employees involved with confined space entry will be properly trained for the role and duties performed. Training will consist of hands-on training with Posillico's confined space entry equipment including harnesses, retrieval equipment, air-line respirators and monitoring equipment. Certification that the training was satisfactorily complete will be provided and documentation maintained.

## 4.0 Procedure

1. Hazard Identification

a. The Project Manager will identify all work that requires tools, equipment, or operations that may produce sparks or temperatures that are sufficient to ignite flammable/combustible materials or atmospheres.

b. The Project Manager will determine if a confined space entry is required and determine if the entry requires a permit. Any situation that has the potential to produce hazardous atmospheres or deplete oxygen will require a permit.

c. This information will be included in the Site Specific Health and Safety Plan to be reviewed with the Health and Safety Division prior to starting the project.

d. The Project Manager will determine if the work can be performed without the use of hot work, i.e. alternative method to reduce the hazard.

e. The Project Manager should consult the Health and Safety Division if the Project Manager has questions on hazard determination. The Project Manager will act as the Entry Supervisor.

f. The Safety Director will review entry with the Project Manager and review this program at least annually to make sure the Program is effective and enforced. Copies of completed permits will be retained for at least one year.

g. The permit program will be reviewed to determine if it is adequate for the projects conducted. Incident reports will be reviewed, employee issues raised and entries reviewed. The permit program will be evaluated to determine if all hazards were adequately identified and evaluated. Additional protective equipment will be purchased, if necessary, for future entries if the review process shows that all hazards were not properly controlled. This review will be part of annual confined space training.

2. Area Preparation

a. The following preparation for the work area will be made once it is determined that hot work is necessary:

- All flammable/combustible materials will be relocated at least 35 feet away from the work area.

- All combustible materials that cannot be reasonably removed from the area will be covered with a fire blanket.

- An appropriate fully charged fire extinguisher and/or charged fire hose will be available at the work area before, during and 1/2 hour after hot work procedures have ended.

- All safety equipment will be on-site and functional.

- The confined space entry area will be appropriately marked and barricaded to prevent impact from external hazards and vehicles. Ground level entries will be ringed with a toe board to prevent objects from inadvertently being dropped into the space.

3. Pre-Work Safety Meeting

   a. The Project Manager will assure that a pre-work safety meeting has been provided to the crew prior to any hot work/confined space entry being performed. Individuals involved with confined space entry will be identified as the authorized entrant(s), attendant and the entry supervisor. Additional individuals may be designated to conduct monitoring for multiple entries. This meeting will include, but not be limited to:

      - Permitting conditions (environmental conditions, type of work to be performed). This would include reviewing the results of the initial monitoring of the test results, ventilation requirements, potential hazards and continuous testing procedures.

      - Personnel authorized to sign-off on the permit. All personnel involved with the confined space entry must sign the permit and acknowledge the hazards expected to be encountered.

      - Location of the permit. (Must be conspicuously posted.)

      - Type of monitoring required. Employees involved with the entry may request additional monitoring or increasing monitoring frequency at any time.

      - Designation of attendant and discussion of duties.

      - Return completed permit to Project Manager or client when work is complete and project has concluded.

   b. During the pre-work safety meeting the authorized entrants will be identified and the entry procedure reviewed. The attendant will be specified and the monitoring and communication procedures reviewed. The entry will be reviewed with the designated entry supervisor before entry. The attendant will be responsible for conducting the air monitoring during the entry and providing results to the entrants and entry supervisor. The designated positions will be posted on the entry permit.

   c. The entry supervisor will be responsible for meeting with the client prior to entry to identify if other contractors or client personnel will be working in close proximity to the confined space entry. The entry supervisor will coordinate entry activities in order to make sure the other work does not impact the entry or endanger entry personnel. The entry supervisor will attend scheduled project meetings with the client and other contractor representatives in order to properly coordinate the entry with other projects.

d. Initial air-monitoring results will be reviewed with the entry supervisor and the authorized entrants prior to entry. Air-monitoring procedures and alarm levels will also be reviewed. Ventilation of the space will be initiated before entry and periodic monitoring conducted prior to entry to verify the ventilation is adequate. Monitoring will be performed throughout entry by the attendant and entrants will wear dosimeters with alarms to conduct monitoring during the entry.

e. The Project Manager will meet with the client to arrange for adequate rescue services from the client, if available, or from outside rescue operations. The Project Manager will discuss rescue procedures with representatives of the rescue operation and allow the rescue team to examine the area, practice the rescue and decline to act as the rescue team if they feel they are not adequately staffed or equipped. The entry cannot be conducted until adequate rescue services are provided.

f. The Project Manager will meet with the client to discuss other projects or contractors that could interfere with Posillico's confined space work. Posillico will coordinate the entry to have minimal impact on other contractors in the area and to make sure Posillico personnel are not endangered by other contractors work.

4. Permit Completion

The Confined Space Work Permit (see Attachment A) will be completed by the Project Manager prior to beginning work each day. The permit will not be considered valid until all personnel involved with the entry have reviewed and signed the entry permit. The entry supervisor will review each permit at the completion of the entry to determine if monitoring and safety procedures are adequate for this project. The permit will be modified if appropriate. The permit will be conspicuously posted at the site of the work.

5. Attendant

A designated Attendant will be present to observe the hot work/confined space operation. The Attendant will maintain contact with personnel and conduct air monitoring. The Attendant will oversee safety retrieval systems and initiate the alarm if rescue is necessary. The Attendant will not perform entry rescue or enter the confined space unless relieved of duty by another authorized Attendant and is equipped with maximum respirator protection. The Attendant will monitor only one confined space entry at one time.

6. Entrant

Entrants will be identified on the permit and instructed on the purpose for the entry of the confined space. Entrants are responsible for adhering to the permit requirements and communicating with the Attendant. Once work tasks are completed the Entrant is responsible for removing equipment, sampling devices and exiting the confined space safely.

7. Atmospheric Monitoring

a. When cutting, grinding, heating or welding surfaces coated with epoxy finishes or paint, or when cutting certain metals with a welding torch, toxic fumes or vapors can be emitted in the process. In these instances, monitoring may be required under the

OSHA Standard. Therefore, it is the responsibility of the Project Manager to notify the Health and Safety Coordinator of these coatings and have them sampled (if unknown) to determine what type of monitoring will be required.

b. Occasionally, a "liner" will be adhered to the inside of a metal duct or tank. When hot work will be performed on such material, the liner will be removed at least 4 inches to each side of the cut to prevent toxic vapors from being emitted, or fire from occurring.

c. After moving all flammable materials out of the work area, the area will be monitored with a Combustible Gas Meter immediately before hot work takes place. LEL readings at or above 5% will necessitate that the area be ventilated before hot work operations begin. **Hot work should not proceed if readings of five percent or below cannot be achieved.**

d. All area monitoring must be performed a minimum of once every 10 minutes when the hot work area is located in a low lying area down slope from a storage area containing flammable and/or combustible liquids.

e. Hot work performed in confined spaces requires that contaminant specific air monitoring be performed. Contact the Health and Safety Division to determine the type of air monitoring required for the contaminant.

f. Hot work performed on containers that previously contained flammable liquids (i.e. underground storage tanks) will not be performed until the Health and Safety Division has been contacted and has approved the work to be performed. Posillico's Site Specific Health and Safety Plan for Flammable and Combustible Underground Storage Tank Removals contains detailed procedures for cleaning, inerting and cutting these types of containers.

g. Entrants and the attendant will continuously evaluate the permit-required space to determine if additional monitoring or more frequent monitoring is necessary. The permit may be revoked or modified accordingly. All entrants will leave the space if unsafe conditions are observed or measured. The permit will be invalidated and reviewed with the supervisor before re-entry is allowed. Additional monitoring will be performed at the request of employees or attendants.

8. Prohibitive Circumstances

a. Hot work will be prohibited if any of the following conditions exist:

- Oxygen levels greater than 21%.
- LEL greater than 5%.
- Organic vapor concentration greater than Permissible Exposure Limits depending on contaminant (ventilation may reduce this hazard).

- Confined space entry will not be permitted if oxygen levels are below 19.5% or if the LEL is >10%. Individual hazardous constituents will be monitored and appropriate levels of respiratory protection will be issued.

9. Conditions of Permit Validity

   a. A permit is not valid unless all necessary inspections and air monitoring (if required) have been performed and all required signatures appear on the permit.

   b. Work permits will be judged as valid for the following time durations:

      - Shift or significant change in personnel.

      - Duration of the hot work.

      - When atmospheric changes dictate ceasing the operation, abate the hazard and reinspect the work area before completing another permit.

   c. Permits are valid up to one day and new permits must be completed each day or whenever the permit conditions change.

   d. The local Fire Department or client emergency services will be contacted prior to entry into confined spaces. They will be notified of the reason for entry and be requested to be available for rescue and administrating first aid. If emergency rescue cannot be provided within three minutes Posillico will not conduct the entry. The permit program will be reviewed to determine if it is adequate for the projects conducted. Incident reports will be reviewed, employee issues raised and entries reviewed. The permit program will be evaluated to determine if all hazards were adequately identified and evaluated. Additional protective equipment will be purchased, if necessary, for future entries if the review process shows that all hazards were not properly controlled. This review will be part of annual confined space training.

   e. Posillico will coordinate the entry with client and/or other contractors present at the job site. Work will be evaluated to determine the impact by non-Posillico staff on the work being conducted.

   f. If conditions change and Posillico employees are at risk the permit will be considered invalid.

   g. The permit will be canceled once the project is complete or conditions change that warrant leaving the site. A new permit will be issued for future entries once a permit has been canceled.

10. Training and Program Review

All workers involved with confined space entry will receive training relative to their role on the project. Since Posillico conducts confined space entry infrequently, training will be conducted prior to each project in order to refresh Posillico employees on the use of the equipment, monitoring procedures and the confined space entry program. The program will be reviewed annually or when new equipment is acquired. All completed permits will be

reviewed and critiqued at the completion of each entry. The entrants and attendants will be interviewed after entry to determine if there were significant problems or concerns.

## 5.0 Definitions

**Fire Blanket**: Blanket made of fire-resistant material, such as NOMEX or KEVLAR (**not asbestos**), or treated wool, which can be used to cover combustible materials to prevent their ignition from sparks, flames or heat during hot work.

**Attendant**: Person who observes the confined space activities/hot work to ensure that ignition of the surrounding material does not occur. The Attendant will be equipped with a fully charged, suitable fire extinguisher and/or charged fire hose at the work area at the time of the hot work. The Attendant will not be assigned to any other duties.

**Confined Space**: Confined spaces are spaces that can be bodily entered but are not meant for human occupancy.

**Entrant:** Person who is trained and authorized to enter a confined space. Entrants are required to review air-monitoring data prior to entry into a PRCS and understand the hazards.

# ATTACHMENT A

# CONFINED SPACE PERMIT

**Posillioc Environmental, Inc.**
**Confined Space Entry Permit**

Location of Confined Space _____ Date/tim _____
Purpose of entry _____ Duration _____

Authorized by _____ Expires on _____
Attendant _____
Authorized Entrants _____

| Measures for isolating & Equipment | **YES** | **NO** | Measures for isolating & Equipment | **YES** | **NO** |
|---|---|---|---|---|---|
| LOTO | | | Protective clothing | | |
| Lines capped | | | Communications equipment | | |
| Purging | | | Hot work permit needed | | |
| Ventilation | | | Other PPE | | |
| Secure area | | | Special conditions | | |
| Harness and retrieval system | | | | | |
| Fire extinguishers | | | | | |
| Air line system | | | | | |
| SCBAs | | | | | |
| Other Respirators | | | | | |

Atmospheric Monitoring

| Tests to be Taken | yes | no | Acceptable entry Conditions | Test # Date: Time: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oxygen | | | 19.5-23.5% | | | | | | | | | | | |
| LEL | | | <10% | | | | | | | | | | | |
| CO | | | <25 ppm | | | | | | | | | | | |
| $H_2S$ | | | <5 ppm | | | | | | | | | | | |
| Other | | | | | | | | | | | | | | |

Individual conducting test:_____
Supervisor authorizing entry_____

- Instruments used:

| Instrument(s) name | Type | Serial # |
|---|---|---|
| | | |
| | | |
| | | |

Standby persons:_____
Emergency and rescue contact:_____

Entry supervisor approval to conduct entry_____ Date/time_____

*APPENDIX J*

# WELDING AND CUTTING SAFETY RULES

# Welding and Cutting Safety Rules

1. Always follow the manufacturer's recommendations for setting up and operating equipment, selection of tip size, and gas cylinder-operating pressures.

2. Always use a regulator to reduce gas cylinder pressure to the operating pressures recommended by the equipment manufacturer. All piping and equipment must meet the standards of the Compressed Gas Association.

3. Always ensure that all connections are leak tight. Each time connections are loosened and retightened each connection should be checked with a soap and water solution (oil free soap). Do not check with a flame.

4. Before "lighting up" clear out each line by letting a small amount of gas flow (separately) to remove any mixed gases that might be in the lines.

5. Never use defective, worn or leaky equipment. Repair it or take it out of service.

6. Never use acetylene in excess of 15-psi pressure. Higher pressures with acetylene are dangerous. If the cylinder is not fitted with a hand wheel valve control, any special wrench required must be placed on the cylinder while the cylinder is in service. On manifolds, one wrench for each manifold will suffice.

7. Always have an appropriate fire extinguisher in good operating condition readily available when operating welding or cutting equipment.

8. Never perform welding, cutting, brazing, or heating operations in a poorly ventilated area. Avoid breathing fumes from these operations at all times, particularly when zinc, cadmium, or lead coated metals are involved.

9. Never perform welding or cutting operations near combustible materials (gasoline cans, paints, paper, rags, etc.).

10. Always protect yourself, others present, welding hoses, gas cylinders, and flammable materials in the area from hot slag and sparks from the welding and cutting operations.

11. The welder and spectators must always wear goggles to protect the eyes from injurious light rays, sparks and hot molten metal during welding, cutting, and heating operations. Eye protection must comply with the established ANSI Standards. Welding screens should be used wherever possible.

12. Always wear clean, oil free clothing during welding and cutting operations. Protect the hands with leather welding gloves to avoid burns from radiation and hot molten slag. Low cut shoes and trousers with cuffs or open pockets should not be worn.

13. Never use a match or cigarette lighter to light a cutting or welding torch. Always use a spark igniter. Fingers are easily burned by the igniting gas when a match or cigarette lighter is used.

14. Ensure that the material being welded or cut is secure and will not move or fall on anyone.

15. Never use a welding, cutting, or heating torch on a container that has held a flammable liquid. Explosive vapors can accumulate and linger in closed containers for extended periods of time.

16. Never use a regulator for gasses other than those for which it was designed for by the manufacturer since the diaphragm and seat materials may not be compatible with other gasses.

17. Never attempt to adapt and use a fuel gas or inert gas regulator on an oxygen cylinder. A special protective device is incorporated on the oxygen regulator to harmlessly dissipate the heat caused by the recompression when the cylinder valve is quickly opened. Such a protective device is not furnished on fuel gas and inert gas regulators.

18. Never tamper with the safety devices on cylinders, fuse plugs, safety discs, etc. and do not permit torch flames or sparks to strike the cylinder.

19. Always refer to the various gasses by their proper names. (Do not refer to oxygen as "air" or acetylene as "gas".)

20. **All cylinders**, particularly acetylene and Oxygen, should be restrained **securely** in an upright position to prevent accidents. A non-vertical position for an acetylene cylinder in use would allow the discharge of acetone through the regulator and into the cutting torch, clogging the mixer passages and creating a fire hazard. It would reduce the efficiency of the flame and contaminate the weld area. It also can cause voids in the porous material inside the cylinder, which can lead to acetylene explosions.

21. During use, acetylene and oxygen tanks should be secured on a welding cart.

22. Store all gas cylinders not in use away from excessive heat sources, such as stoves, furnaces, radiators, the direct rays of the sun, and the presence of open flames. Cylinders in storage should always be **secured** in an upright position. Acetylene tanks will be stored at a minimum of 25 feet away from oxygen tanks.

23. Keep all burning or flammable substances away from the oxygen or fuel gas storage area (at least 20 feet) and post "No Smoking" signs.

24. Upon completion of a welding, heating, or cutting operation immediately inspect the surrounding areas for smoldering embers. Allow at least one half hour to elapse before leaving the area and conduct another thorough inspection just before leaving. Also alert other personnel of fire possibilities.

25. Always have the properly fitted wrench to fasten a regulator to a cylinder. Never tighten the regulator by hand.

26. Always leave the fuel gas cylinder valve wrench in place when the cylinder valve is open so that it can be closed quickly in an emergency. Do not open acetylene valves more than one-quarter (1/4) turn.

27. Before connecting a regulator to a gas cylinder, open the cylinder valve for a moment. Called cracking the cylinder valve, this will blow out any foreign material that may have lodged in the valve during transit. Do not stand in front of the valve when “cracking”.

28. After attaching a regulator to a gas cylinder, be sure the regulator adjusting screw is fully released (backed off in a counter clockwise direction so that it swivels freely) before the cylinder valve is opened. Never stand in front of a regulator when you are opening a cylinder valve.

29. Always open the cylinder valve slowly so that gas pressure will build up slowly in the regulator (particularly in the oxygen cylinder). Quick opening of the cylinder valve causes a buildup of heat due to recompression of the gas. When combined with combustible materials, ignition and explosion may result.

30. If a leak develops in a fuel gas cylinder that cannot be stopped by closing the valve, immediately place the cylinder outside of the building away from possible fire or ignition sources in a location that is free from wind currents that might carry the gas to an ignition source.

31. Never attempt to mix gasses in a cylinder or fill an empty one from another (particularly oxygen cylinders). Mixture of incompatible gasses and/or heat caused by recompression of the gas or gasses may result in ignition and fire. Only the owner of a cylinder may mix gasses in it.

32. When a gas cylinder is ready for return to the supplier, be certain the cylinder valve is closed to prevent internal contamination and the shipping cap is in place to protect the cylinder valve. Identify empty cylinders properly.

33. Never use oxygen or other gasses as a substitute for compressed air in operation of air-operated tools, blowing off parts, or for ventilation purposes. The only exception to this rule is where oxygen is used to blow out port passages and talcum powder or dust from welding hoses when setting up new or old “dusty” equipment.

34. Do not attempt to do your own repair on welding equipment. Equipment that is improperly repaired can cause leaks and other hazardous conditions. Qualified repair personnel must perform repairs.

35. Never repair welding hose with tape. Use of tape and many hose splices can reduce the pressure to the torch and can cause hazardous conditions. Welding hose must meet the specifications of the Compressed Gas Association.

36. Use the shortest length of hose possible. Longer hoses require higher gas pressures and can be hard to handle.

37. Never use oil or grease on any part of welding or cutting equipment and never let it come into contact with oil or grease. This includes gas cylinders, workbench, regulators, torches, tips, threads on bottles, and clothes that are worn, such as jackets, gloves, and aprons. Oxygen and oil or grease can cause explosions and fire.

38. Never use a hammer on the valve cover caps to loosen them. Use a piece of wood to soften the impact and prevent sparks and damage to the cap.

39. When moving gas cylinders always roll them on their bottom edges or in a cart designed for their movement. Sliding or dragging them or rolling causes excessive wear and may weaken their walls by metal erosion. Slings and electromagnets are not authorized when transporting cylinders.

40. Never use cylinders as rollers to move material. Do not let them bump into each other or let them fall.

41. Fuel gas and liquefied fuels must be stored and shipped valve end up.

42. Do not hammer on any cylinder. Do not tamper with the relief valves. If you have trouble, contact the supplier for assistance.

43. Suitable eye protection must be worn for all welding and cutting operations.

44. Cylinders must be secured. Valves must be closed when unattended and caps must be on the cylinders when the regulators are not on the cylinders.

45. Cylinders must be upright when they are transported in powered vehicles.

46. All cylinders with a water weight of over 30 lbs. must have caps or other protection.

47. All fuel gases must be used through a regulator on cylinder or manifold.

48. Compressed gas cylinders must be upright except for short periods for transportation.

49. Repair work on gauges and regulators must be done by qualified personnel.

50. Only 4 inches of hose per foot may be covered with tape. Defective hoses must be removed from service.

51. Oxygen must not be used for ventilation.

52. Oxygen regulators must be marked “Use No Oil”. Regulators and fittings must meet the specifications of the Compressed Gas Association.

53. Union nuts on regulators must be checked for damage.

54. Before removing a regulator, shut off cylinder valve and release gas from regulator. Equipment must be used only as approved by the manufacturer.

55. Caps must be on cylinders unless they are transported on a special carrier.

56. Hot warnings on materials are required.

57. Fire is the biggest hazard in welding. The area should be cleared for a radius of 35 feet. Fire shields should be used. The area should be monitored for 30 minutes or more after end of work to ensure there is no delayed ignition.

58. Proper personal protective equipment must be worn by all welders and assisting personnel.

59. All welding personnel should be advised of the hazards from heating zinc, lead, cadmium, and any other substances that could cause health problems from the welding activity.

***(The following apply to arc welding)***

60. Chains, wire ropes, hoists, and elevators must not be used to carry welding current.

61. Leather capes should be used for overhead welding.

62. The neck and ears must be protected from the arc.

63. Conduits with electrical conductors in them must not be used to complete a welding circuit.

64. Welding shields must be used to protect other workers from injurious light rays.

65. Welding leads must be inspected regularly for damage to insulation. Only proper splicing will be authorized. There should be no splices in stinger lead within 10 feet of the stinger and the leads should never be wrapped around the body.

66. A designated, competent person must inspect welding equipment and gas cylinders.

67. Output lugs on welders require the protective boots to be in place.

*APPENDIX K*

# PERSONAL PROTECTIVE EQUIPMENT (PPE) PROGRAM

# PERSONAL PROTECTIVE EQUIPMENT (PPE) PROGRAM: SELECTION AND USE

## Purpose

This program has been written to help the worker choose the correct Personal Protective Equipment (PPE) for the job. Familiarity with the different levels of protection (A, B, C and D) will help speed up the selection process. Careful selection and use of adequate PPE should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing. Posillico employees may work at a variety of job sites and locations which may require different types of protective equipment. Client specific requirements will always be adhered to. Posillico will supply all PPE or reimburse the employee for the costs of PPE if the PPE is required as part of the project.

## Scope

This program establishes criteria for the selection, use, donning and doffing, inspection, maintenance, storage, decontamination of PPE, and evaluation. This information is general, and specific PPE use should be included in the site-specific health and safety plan (SSHSP) prepared for each project.

## OSHA Requirements (29 CFR 1910.120)

A written personal protective equipment program, which is part of the employer's safety and health program and also part of the site-specific health and safety plan, shall be established. The PPE program shall address the elements listed below.

- PPE selection based upon site hazards;
- PPE use and limitations of the equipment;
- Work mission duration;
- PPE Maintenance and storage;
- PPE decontamination and disposal;
- PPE training and proper fitting;
- PPE donning and doffing procedures;
- PPE inspection procedures prior to, during and after use;
- Evaluation of the effectiveness of the PPE program; and
- Limitations during temperature extremes, heat stress, and other appropriate medical considerations.

OSHA Standard 29 CFR 1910.132 requires employers to assess the employer's workplace and determine if hazards are present that necessitate the use of personal protective equipment (PPE). This assessment must be certified in writing and documented.

Due to the variety of job sites and situations that Posillico personnel may be involved in, it is important that Posillico maintain a consistent approach in complying with health and safety procedures. The project manager and/or site supervisor are responsible for ensuring that all personnel wear the appropriate PPE. Failure to comply with these requirements may result in disciplinary action. Employee safety is a paramount concern for all Posillico managers and employees. We all must make every effort to protect ourselves and each other from harm. These procedures will now require the following:

1. Protective footwear must be worn by all field personnel working in the field. Footwear must at a minimum include steel toe and shank protection. Protective footwear must meet ANSI Z41-1991. Additionally, chemical protective footwear may also be required if the potential for contaminated materials exists. This type of protection will be required on a site-specific basis.

2. Eye protection must be worn by all personnel, subcontractors and visitors at all times. Eye protection should be in place as the job site is entered and remain on until the work area is exited. Eye protection does not have to be work inside enclosed cabs, automobiles or job trailers. Eye protection must include side shields. Prescription lenses worn as eye protection and other protective eyewear must meet ANSI Z87.1.

3. Hardhats are to be worn by all field personnel when in the field. New hardhats must meet ANSI Z89.

4. Hi-visibility ANSI II approved Vests are to be worn at all times. Vests should be closed in front and back.

5. Hand protection is to be worn on a site-specific basis. The hand protection must be selected based on the chemical hazards expected to be encountered. Posillico maintains a stock of a variety of gloves including:

   Best: Nitrile N-Dey
   PVC
   Latex
   Vinyl
   Solvex, Nitrile
   Leather Work Gloves

   Additionally, nitrile coated Kevlar gloves or other types of puncture resistant gloves are to be worn by all personnel working with or cleaning glass impingers. Manufacturers that supply these gloves include Ansell Edmont, Jomac and Wells Lamont. Insulated electrical gloves with outer leather gloves is required when working around high-voltage systems.

   Posillico is responsible for supplying all personal protective equipment required for Posillico's projects

## Work Mission Duration

Before donning any PPE ensembles, workers will estimate their anticipated work duration. There are several limiting factors that affect the length of work time. These factors must be addressed:

- Air supply consumption
- Permeation and penetration of the Chemical Protective Clothing/ensemble;
- Ambient temperature; and
- Coolant supply (ice or chilled area to keep the worker's body temperature at a normal temperature).

## Level of Protection

The following section describes the different levels of protection (A through D). Each level is described in the following manner: the protection provided; when this particular level of protection should be used; recommended and optional equipment; and, any limiting criteria.

1. Level A

   a. Protection provided:

      - Level A provides the highest available level of respiratory, skin and eye protection.

   b. Should be used when:

      - The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on any of the following circumstances;

      - Measured (or potential for) high concentration of atmospheric vapors, gases or particulates;

      - Site operations and work functions involving a high potential for splash, immersion, or exposure to unexpected vapors, gases or particulates of materials that are harmful to skin or capable of being absorbed through intact skin;

      - Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible;

      - The Operations must be conducted in confined, poorly ventilated areas until absence of conditions requiring Level A protection is determined.

   c. Recommended equipment:

      - Pressure-demand, full facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA;

- Fully-encapsulating, chemical-resistant suit (pressure-tested immediately before use);

- Inner chemical-resistant suit;

- Inner chemical-resistant gloves;

- Chemical-resistant safety boots/shoes; and

- Two-way radio communications.

d. Optional equipment:

- Cooling unit;
- Coveralls;
- Long cotton underwear;
- Hard hat; and
- Disposable gloves and boot covers.

e. Limiting criteria:

- Fully encapsulating suit material must be compatible with the substances involved.

2. Level B

a. Protection provided:

- The same level of respiratory protection, but less skin protection than Level A.

b. Should be used when:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection. This involves atmospheres with IDLH concentrations of specific substances that do not represent a severe skin hazard, or that do not meet the criteria for use of air purifying respirators;

- Atmospheres contain less than 19.5% oxygen; and

- Presence of incompletely identified vapors or gases indicated by direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

c. Recommended equipment:

- Pressure-demand, full facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA;

- Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit);

- Inner and outer chemical-resistant gloves;

- Chemical-resistant safety boots/shoes;

- Hard hat; and

- Two-way radio communications.

d. Optional equipment:

- Coveralls;
- Disposable boot covers;
- Face shield; and
- Long cotton underwear.

e. Limiting criteria:

- Use only when the vapors or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through the intact skin.

- Use only when it is highly unlikely that the work being done will generate either high concentrations of vapors, gases or splashes of material that will affect the exposed skin.

3. Level C

a. Protection provided:

- Level C provides the same level of skin protection as Level B, but a lower level of respiratory protection.

b. Should be used when:

- The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin;

- The types of air contaminants have been identified, concentrations measured, and a canister/ cartridge is available that can remove the contaminant; and

- All criteria for the use of air-purifying respirators are met.

c. Recommended equipment:

- Full facepiece or half facepiece air-purifying negative pressure respirator;
- Chemical-resistant clothing;
- Inner and outer chemical-resistant gloves;

- Chemical-resistant safety boots and shoes;
- Disposable boot covers;
- Hard hat; and
- Two-way radio communications.

d. Optional equipment:

- Coveralls;
- Face shield;
- Escape bottle; and
- Long cotton underwear.

e. Limiting criteria:

- Atmospheric concentration of chemicals must not exceed IDLH levels; and
- The atmosphere must contain at least 19.5% oxygen.

4. Level D

a. Protection provided:

- No respirator protection and minimal skin protection.

b. Should be used when:

- The atmosphere contains no known hazard; and
- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

c. Recommended equipment:

- Coveralls;
- Safety boots/shoes;
- Safety glasses or chemical splash goggles; and
- Hardhat.

d. Optional equipment:

- Gloves;
- Escape bottle; and
- Face shield.

e. Limiting criteria:

- This level should not be worn in the exclusion zone; and
- The atmosphere must contain at least 19.5% oxygen.

## Level of Protection Utilized

Due to the nature of our work, it can be reasonably expected that personnel will not be performing any work that will require the use of Level A protection. Posillico will not directly undertake assignments and Posillico does not generally train or equip its personnel to handle circumstances involving Level A protection. If Posillico is working on a site and Level A is deemed necessary, the work will be subcontracted to a qualified firm. Posillico personnel should not directly undertake these tasks.

Sites where Posillico is working often require the use of Level C or D, with Level B equipment available on-site for emergency rescue. Any questions concerning the level of protection necessary to complete a certain task will be directed to the Health and Safety Assessment Division before setting up the job.

## Types of PPE to be Potentially Utilized by Posillico

The following list contains types of PPE utilized by Posillico and their uses on the job, as they may apply to a specific site.

1. Respiratory Equipment:

    a. SCBAs:

        - Used for emergency rescue and exposures greater than maximum use concentration limits set for canister/cartridge type negative pressure respirators.

    b. Supplied-air respirators:

        - MSA Premaire system.

    c. Negative pressure respirators:

        - Half face and full face, used for exposure to certain types of acid gases, organic vapors and particulates not greater than the canister/cartridge maximum use concentration limit.

2. Chemical protective apparel suits:

    a. Polycoated Tyvek, Saranex, Chemrel and Tyvek (porous). Provide protection against certain liquid chemicals.

        - Tyvek provides protection against particulates only.

    b. Fire/flame retardant coveralls:

        - Provide protection against flash fires.

3. Insulated clothing (Provides protection against exposure to the cold:

    a. Chemical resistant gloves:

        - Provide protection for the hands against chemical splashes.

    b. Disposable boot covers:

        - Protect safety boots from contamination and feet from contact with chemicals.

4. Eye protection:

    a. Safety glasses and chemical splash goggles.

        - Safety glasses protect the eyes against large particles and projectiles.
        - Chemical splash goggles protect the eyes against vaporized chemicals, splashes, large particles, and projectiles.

    b. Vented goggles do not provide protection against vapors and are not adequate for splashes, as material may seep inside the goggles.

5. Hard hat:

    a. Provides protection against blows to the head. When worn with a liner, provides protection against the cold.

6. Construction safety boots:

    a. Steel-toe and shank construction boots with chemically resistant soles protect the feet from heavy and sharp objects, and contact with chemicals.

7. Safety harnesses and lifelines:

    a. Enable the individual to work in elevated areas or enter confined spaces to prevent falls and aid in rescue.

8. Hearing protection:

    a. Provides protection against physiological damage and psychological effects.

9. Canvas work gloves:

    a. Provide protection for the hands against abrasions and slivers.

## Selection of Chemically Protective Clothing

1. Chemically-protective clothing (CPC) will be chosen in the following manner:

    a. Determine what chemicals are present on the site.

b. CPC chosen must be resistant to permeation, degradation and penetration of the chemical(s).

- Permeation - Process by which a chemical dissolves in and/or moves through a protective clothing material on a molecular level.

- Degradation - The loss of or change in the fabric's chemical resistance or physical properties due to exposure to chemicals, use or ambient conditions (e.g., sunlight).

- Penetration - The movement of chemicals through zippers, stitched seams or imperfections (e.g., pinholes) in CPC.

c. c. Review manufacturer's permeation data to determine the performance characteristics of the material to the specific chemical.

d. d. Select CPC that protects against the greatest range of chemicals on the site and has the longest breakthrough time.

e. e. Discuss choice of CPC with the Health and Safety division prior to setting up the job.

## Donning and Doffing Procedures

The following procedures will be used by Posillico employees and Posillico subcontractors for donning and doffing PPE at protection Levels B and C. Donning and doffing will be performed with the assistance of an individual(s) located in the Support Zone and Contamination Reduction Zone, respectively. This individual will help the worker tape up and adjust PPE for proper fit, as well as remove PPE after decontamination.

1. Donning PPE

   a. Inspect the clothing and respirator before donning.

   b. Unzip the suit.

   c. Step into the legs of the suit, slipping the feet through the legs. Push arms through the sleeves.

   d. Pull leg cuffs over the feet.

   e. Put on chemical-resistant safety boots over the feet. Tape the leg cuff over the tops of the boots.

   f. Pull over chemical-resistant boot covers and tape over the leg cuff.

   g. If suit contains protective feet, wear chemical-resistant safety boots inside the suit with chemical-resistant boot covers over the suit and taped securely to the leg.

h. If wearing a SCBA, don the facepiece and adjust it to be secure, but comfortable. Do not connect the breathing hose. Open valve on the air tank.

i. If wearing a negative pressure respirator, pull hood over the head and perform positive and negative pressure facepiece seal test (procedures are written in the Posillico's Respiratory Protection Program).

j. Pull on chemical protective inner gloves.

k. Pull on chemical protective outer gloves and tape securely to the sleeve of the suit.

l. Securely tape the suit to protect all exposed skin around the neck area, and if wearing a full facepiece, tape around the edge of the hood-to-facepiece junction.

m. Put on hardhat, if needed, and tape securely on top of head so that the hard hat does not slide off.

2. Doffing PPE

a. Doffing of PPE will not take place until the individual has been properly decontaminated by a suitably attired assistant. Both the worker and assistant will make every effort to avoid any direct contact with the outside of the suit.

b. If the individual is wearing a SCBA, the hose connection to the diaphragm will be disconnected, leaving the facepiece on the wearer. The remainder of the unit will be removed and decontaminated before proceeding further.

c. If the individual is wearing a half-face or full-face negative pressure respirator, she/he will be instructed to leave it on until the doffing procedure is complete.

NOTE: Decontamination is to be performed in accordance with the Site-Specific Health and Safety Plan for the site.

## Decontamination of PPE

Whenever possible, disposable PPE will be used on-site. Disposable PPE includes the following:

- Chemical protective suits;
- Gloves; and
- Chemical protective boot covers.

After decontaminating the worker, PPE is disposed of on-site in labeled disposal containers. Complete procedures for the decontamination, cleaning, inspection, maintenance and storage of respiratory equipment is covered under Posillico's Respiratory Protection Program. All PPE must be cleaned and properly stored. If Posillico-owned PPE cannot be cleaned or disinfected or is damaged it will be replaced by Posillico.

# Inspection of PPE

PPE will be inspected prior to, during and after each use according to the procedure outlined below.

1. Prior to use (Reusable and Disposable PPE):

    a. Through reviewing available literature, determine that the clothing material is correct for the task.

    b. Visually inspect for:

        - Imperfect seams;
        - Non-uniform coatings;
        - Tears or holes; and
        - Malfunctioning closures.

    c. Hold up to the light and check for pinholes (inflate gloves and check for leaks).

    d. Flex and check for:

        - Cracks; and
        - Shelf deterioration.

    e. If previously used, check for:

        - Discoloration;
        - Swelling;
        - Stiffness and cracking; and
        - Holes and tears.

2. During use (Reusable and Disposable PPE), check for:

    a. Evidence of chemical attack.
    b. Discoloration, swelling, stiffening, softening and/or cracking.
    c. Tears.
    d. Punctures.
    e. Seam discontinuities.

**Note:** Report any sense of breakthrough to the Health and Safety Assessment Division. Medical monitoring may be necessary to determine the extent of exposure.

3. After use (Reusable PPE), check for:

    a. Malfunctioning parts.
    b. Evidence of chemical attack.
    c. Punctures.
    d. Tears.
    e. Cracks.

**Note:** Posillico's Respirator Protection Program addresses complete inspection procedures and will be consulted for inspection of all respiratory equipment.

## Maintenance and Storage of PPE

PPE, other than respiratory equipment (covered under Posillico's Respiratory Protection Program), will be maintained and stored in accordance with the manufacturer's recommendations at a minimum to prevent damage due to exposure to dust, moisture, sunlight, chemicals, temperature extremes and sudden impact.

PPE will be stored in Field Operations Equipment bags. Before and after each use, the PPE will be inspected to determine whether or not it is still "field worthy". Any PPE found to be defective will be reported to the Health and Safety Assessment Division and either discarded or repaired, as appropriate. Under no circumstances will defective PPE be used in the field.

1. The Health and Safety Assessment Division will periodically inspect PPE issued for individual use.

    a. Unless the equipment can be repaired, any PPE found to be defective will be removed from service and discarded immediately.

    b. Repairable PPE will be tagged, returned to the Facility Manager and sent out for repair.

## Training

Posillico will provide the proper equipment to employees and train them on the proper use. At a minimum, each employee using PPE must know:

- When PPE is necessary
- What PPE is necessary and which PPE has been selected for each process the employee operates
- How to properly put on, take off, adjust and wear PPE
- The limitations of PPE
- How to determine if PPE is no longer effective or is damaged
- How to get replacement PPE
- How to properly care for, maintain, store and dispose of PPE

After employees have been trained, periodic assessment of the process/equipment will be conducted ensure that the PPE is adequate and training is appropriate.

Retraining employees will occur whenever:

- Changes in the workplace render the previous training obsolete
- Changes in the type of PPE render previous training obsolete
- Employer observed inadequacies in an employee’s knowledge or use of assigned PPE indicates that an employee has not retained the necessary understanding or skill

Posillico verifies that each employee who is required to use PPE has received and understood the required training. Training is confirmed by written certification which included the employee name, the dates of training, and the certification subject.

## Evaluation Of PPE Program

Posillico's Personal Protection Equipment Program will be reviewed annually by the Health and Safety Assessment Division. Any program deficiencies that are identified by a Posillico employee will be reported to the Health and Safety Assessment Division, so that changes will be made immediately. All employees affected by the change(s) will be notified in writing.

Review of the PPE Program will include, but not be limited to, the following:

- Accident and illness experience on various job sites.
- Type and degree of exposure.
- Adequacy of equipment selection process.
- Degree of fulfillment of program objectives.
- Employee acceptance.
- Coordination with overall health and safety program elements.
- Recommendations for program improvements and modifications.
- Adequacy of program records.

## Employee Owned Equipment

Posillico does not allow the use of employee-owned equipment on job sites.

*APPENDIX L*

# RESPIRATORY PROTECTION PROGRAM

## Purpose:

The purpose of the Respirator Program is to ensure that all employees are protected from exposure to respiratory hazards. Engineering controls such as ventilation and substitution of less toxic materials are the first line of defense. However, engineering controls are not feasible for some operations or do not completely control the identified hazards. In these situations, respirators and other protective equipment must be used. Respirators are also utilized for protection during emergencies.

## Procedure:

This program applies to all employees who are required to wear respirators during normal work operations and during certain non-routine or emergency operations. Employees participating in the respiratory protection program do so at no cost to them. The expense associated with medical evaluations, training, and respiratory protection equipment will be borne by the company.

- Respirator equipment is required in areas where health hazards may exist due to accumulations of dusts, fumes, mists or vapors. If your job requires the use of a respirator see your supervisor for training and the proper respirator for the working conditions at hand.

Employees who voluntarily choose to use a cartridge style respirator when the respirator is not required are subject to the medical evaluation, cleaning, maintenance, and storage elements only of this program. These individuals will also receive training covering proper procedures for cleaning, maintenance and storage of their respirators.

Posillico has a full written Respiratory Program as listed below.

# Respiratory Protection

## *Purpose*

The purpose of this program is to establish, implement and maintain an appropriate Respiratory Protection Program to protect employees from respiratory hazards on our jobsites. Respiratory Protection is an area of Safety and Health that Posillico Inc. takes extremely seriously.

Through education and training, we believe that working in and around respiratory hazards and environments can be managed safely and effectively. As a company, we believe in engineering out or administratively controlling respiratory hazards and environments. When these controls cannot be instituted, we will use appropriate respiratory protection. Posillico Inc. shall ensure that respiratory hazards within our sites are evaluated and that information concerning these hazards is transmitted to all affected employees through our construction planning process.

### *Applicable Regulations*

OSHA 29 CFR 1910.134

### *Responsibilities*

The Posillico Safety Director is responsible for respiratory protection program and has the authority to make necessary decisions to ensure its implementation and maintenance. The Safety Director has the authorization to halt any company operation where there is danger of serious personal injury or unnecessary exposure;

A corporate respiratory program administrator shall be appointed and shall approve all site specific respiratory programs prior to implementation at the site, and thereafter review as required;

The program shall be reviewed and evaluated on an annual basis, or when changes occur to 29 CFR 1910.134, that prompt revision of this document or when facility operational changes occur that require a revision to the program;
The corporate respiratory program administrator shall conduct routine evaluations to ensure the written program is being followed. Topics to be considered during the evaluation shall consist of: respirator fit, selection, maintenance, interference with job performance, discomfort, employee concerns; and

Provide a database of Medical Evaluation Questionnaire and Fit Test results of each employee required to wear respiratory protection.

## Project Management shall:

Evaluate work activities for the presence of respiratory hazards and prepare construction plans for each activity;

Institute engineering and administrative controls, as a first line of defense against respiratory hazards;

Shall appoint a qualified individual to be the Site Respiratory Program Administrator who shall prepare the **Work Site Respiratory Programs** (WSRP) for each substantially unique airborne exposure at the jobsite. The Site Respiratory Program Administrator shall submit the WSRP(s) to the Corporate Respiratory Program Administrator for approval before the use of respirators begins. And shall ensure the successful implementation of the WSRP(S) on the jobsite;

Purchase suitable, effective, respirators to protect employees from respiratory hazards;
Ensure each employee wearing respiratory protection has the required medical clearance and fit test record prior to wearing the respirator;

Train employees in topics identified in this program; and

Effectively enforce the use of respirators.

## Employees shall:

Correctly wear respirators in accordance with instructions and training during operations designated by their supervisor;

Not have facial hair of any type that interferes with the correct fit of a respirator;

Properly clean, store and maintain respirators according to the direction of the manufacturer or their supervisor; and

Guard against damage to the respirator and shall immediately replace suspect respirators and shall report such damage or malfunction of the respirator to their supervisor.

### *Procedure*

## Site-Specific Respiratory Protection Program

In addition to meeting the requirements of this program, all projects that use respirators will be required to have a site-specific respiratory protection program;

In order to have an effective program, address the following questions in the development stage:

- Who is the program administrator?
- What procedures are used to select respirators for use in the workplace?
- Who will be doing the medical evaluations for the employees (which facility or facilities)?
- What are the fit testing procedures for tight fitting respirators?
- What are the procedures for proper use of respirators in normal and foreseeable emergencies?
- What are the procedures and schedules for cleaning, disinfecting, storing, inspection, repairing, discarding and otherwise maintaining respirators?
- What are the procedures to ensure adequate air quality, quantity and flow of breathing for atmosphere supplying respirators?
- What are the methods to be used to ensure that the employees are trained the in respiratory hazards to which they are potentially exposed during routine and emergency situations?
- What are the methods of training employees in the proper use of respirators including, donning and removing a respirator, cleaning, positive/negative pressure fit testing, limitations of their use and maintenance and cleaning of a respirator?
- What are the procedures of regularly evaluating the effectiveness of a program?
- When respirator use is not required, but are provided at the request of the employees or permit employees to use their own respirators, the following criteria will be met:
    - Determine that such respirator use does not create a hazard;
    - Review 29 CFR 1926.134; and
    - Training on cleaning, storage and maintenance of the respirator to prevent it from being a hazard.

## Surveillance of Work Area Conditions

As each activity progresses, surveillance of work area conditions and degree of employee exposure or stress shall be monitored and measured;

The site Safety Representative will make a reasonable estimate of employee exposure by conducting a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency.

The evaluation may include:

- Identification and review of a list of hazardous substances used in the work area;
- Review of work processes to determine source of potential hazardous substances;
- Review of process records;
- Employee interviews;
- Air Monitoring (may be mandatory if the contaminant is regulated by a separate OSHA Standard e.g. Asbestos, Lead, Silica, Methylene chloride, etc.);
- Published studies by safety associations, manufacturers, historical data;
- Mathematical approaches using physical & chemical properties of the contaminant;
- If a reasonable estimate cannot be obtained then IDLH atmosphere must be assumed; and
- The site Safety Representative will revise and update the hazard assessment as needed.

Air Sampling will be conducted as per the requirements in this section.

## Air Sampling Procedure

Baseline sampling shall commence at the beginning of each operation, which is identified as a potential for airborne exposure. Historical data from similar operations producing airborne exposure can be used as baseline exposure monitoring, when feasible, but must be evaluated according to activity, length of operation, conditions in which the samples were taken, etc;
Personal air sampling shall always be the first method to determining actual employee exposure. Area monitoring shall be used to supplement personal air sampling but shall not be the only method of determining exposure;

Air Sampling will be representative of the exposure that the employee is exposed to throughout his daily shift;

An Air Monitoring Worksheet shall be completed for each sample taken on any given day. If several different samples are taken on the same day then one Air Monitoring Worksheet can be filled out providing the conditions for each employee are the same, otherwise a separate worksheet is required;

A Chain of Custody will be completed for each batch of samples that are to be sent to the Laboratory for analysis, along with the Air Monitoring Worksheet. Both these documents are to remain with analysis received back from the Laboratory;

If the initial baseline results demonstrates employee exposure to be below the action level, then; Personal and Area Air Sampling will take place thereafter on at least three consecutive measurements taken at least seven (7) days apart;

## Air Sampling Frequency

Results will be dealt with as follows:

- Where results demonstrate that the employee exposure is below the action level, monitoring shall be continued until sampling shows no exposure on at least three consecutive measurements taken at least seven (7) days apart;
- Where results demonstrate that the employee exposure is above the action level, but below the permissible exposure limit, monitoring shall be repeated at least every 6 months. The monitoring shall continue until at least two consecutive measurements, taken at least 7 days apart, are below the action level, at which time the monitoring for that employee or operation may be discontinued; and
- If the initial monitoring reveals that employee exposure is above the permissible exposure limit, the monitoring shall be repeated quarterly. The monitoring shall continue until at least two consecutive measurements, taken at least 7 days apart, are below the permissible exposure level, at which time the monitoring for that employee or operation may be discontinued.

Whenever there has been a production, process, control or personnel change which may result in new or additional exposure to any contaminant, or whenever Posillico Inc. has any reason to suspect a change which may result in new or additional exposures, additional monitoring shall be conducted; and

The Corporate Respiratory Program Administrator shall supervise air monitoring results and exposure assessment.

## Medical Evaluation

Persons shall not be assigned to tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work and effectively use the equipment;

The Corporate approved physician(s) will be used in all instances for medical evaluate and clearance for respirator use;

Prior to work commencing, each required employee shall complete a **Medical Evaluation Questionnaire (MEQ)** in accordance with CFR 1910.134. This shall be sent to the approved physician for clearance;

The examining physician will then evaluate the employee, based on their answers, and certify clearance for respirator use under any conditions that they see fit. This may involve clearance by MEQ alone, consultation with the Physician and/or a medical examination;

This clearance will be forwarded to the Corporate Respiratory Program Administrator and the Site Respiratory Program Administrator for processing and record keeping. Any conditions stated on the clearance will be followed; and

Additional medical evaluations shall be provided when:

- An employee has any change in medical status;
- An employee reports medical signs or symptoms that are related to ability to use a respirator; and
- The physician states that the employee needs to be re-evaluated.

## Fit Test Procedure

The procedures in Appendix A in section 29 CFR 1926.103 are to be followed. A medical evaluation needs to be completed prior to fit testing an employee;

Fit testing will be performed using Quantitative Fit Testing measures. If this is not available, then qualitative means may be used until the quantitative means are available;

Select respirators from a sufficient number of respirator models and sizes to assure that the respirator is acceptable to, and correctly fits, the user;

Fit tests will be done before using the respirator in the field and will be repeated annually, when a different type or brand of respirator is worn or when there is a significant physical difference in the employee such as body weight, facial scarring, dentures, broken jaw;

The absence of one or both dentures can seriously affect the fit of a face piece. The worker's diligence in observing these factors shall be evaluated by periodic checks;

To assure proper protection, each wearer will complete positive and negative checks to ensure seal;

Hair. Fit testing shall not be conducted if there is any hair growth between the skin and the facepiece seal surface.

Respiratory Difficulty during Tests. If an employee exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties;

Respirator Use Determination. The test subject shall be given the opportunity to wear the assigned respirator for one week. If the respirator does not provide a satisfactory fit during actual use, the test subject may request another fit test, which shall be performed immediately;

Filter Replacement. Filters used for qualitative or quantitative fit testing shall be replaced weekly, whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media. Organic vapor cartridges/canisters shall be replaced daily or sooner if there is any indication of breakthrough by the test agent.

Because the sealing of the respirator may be affected, quantitative fit testing shall be repeated immediately when the test subject has a:

- Weight change of 20 pounds or more;
- Significant facial scarring in the area of the facepiece seal;

- Significant dental changes; i.e., multiple extractions without prosthesis, or acquiring dentures;
- Reconstructive or cosmetic surgery; and
- Any other condition that may interfere with the facepiece seal.

Fit Test Record keeping Requirements. A summary of all test results shall be maintained for 3 years. The summary shall as minimum include:

- Name of test subject;
- Date of testing;
- Name of the test conductor; and
- Fit factors obtained from every respirator tested (indicate manufacturer, model, size and approval number).

## Selection of Respirators

Dust masks are not permitted for use as a respirator on any project under any circumstances;

The respirator furnished shall provide adequate respiratory protection against the particular hazard for which it is designed;

All filter cartridges and canisters shall be labeled with the appropriate NIOSH approval label that has been certified under the NIOSH 42 CFR Part 84. This label is not to be removed, obscured, or defaced while in service. Only series 100 filters certified under 42 CFR Part 84 shall be used when HEPA filters are called for;

Gas or Vapor protection – If a respirator with an End of Service Life Indicator (ESLI) is not available; a change-out schedule will be specified on a site-specific basis. Every effort will be made to obtain objective information and data to assure that the cartridges are changed out prior to end of service life;

Respirators will be selected based on the specific hazard involved and shall be selected in accordance with the manufacturer's instructions or other related requirements (OSHA or ANSI Standards, NIOSH, etc.). The criteria specified in the following table shall be used:

| Hazard | Respirator* |
|---|---|
| Oxygen Deficiency | Self-contained breathing apparatus. Hose mask with blower. Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm. |
| Gas & Vapor (Contaminants immediately dangerous to life and health) | Self-contained breathing apparatus. Hose mask with blower. Air purifying full-face piece respirator with chemical canister (gas mask). Self rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm. |
| Gas & Vapor (Contaminants NOT immediately dangerous to life and health) | Airline respirator. Hose mask without blower. Air purifying half-mask or mouthpiece respirator with chemical cartridge. |
| Particulate Contaminants (Contaminants immediately dangerous to life and health) | Self-contained breathing apparatus. Hose mask with blower. Air purifying full-face piece respirator with chemical canister (gas mask). Self rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm. |
| Particulate Contaminants (Contaminants NOT immediately dangerous to life and health) | Air-purifying half-mask or mouthpiece respirators with filter pad or cartridge. Airline respirator. Airline abrasive-blasting respirator. Hose mask without blower. |
| Combination Gas, Vapor & Particulate (Contaminants immediately dangerous to life and health) | Self-contained breathing apparatus. Hose mask with blower. Air purifying full-face piece respirator with chemical canister (gas mask with filter). Self rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm. |
| Combination Gas, Vapor & Particulate (Contaminants NOT immediately dangerous to life and health) | Airline respirator. Hose mask without blower. Air purifying half-mask or mouthpiece respirator with chemical cartridge and appropriate filter. |

* For the purpose of this part, “Immediately Dangerous to Life and Heath”, (IDLH), is defined as a condition that either poses an immediate threat to life and health or an immediate threat of severe exposure to contaminants, such as radioactive materials, which are likely to have adverse delayed effects on health.

## Use of Respirators

The correct respirator shall be specified for each job, the respirator type shall be specified in the site specific respiratory plan, by the Site Safety Representative or designated individual, who supervises the respiratory protection program. This shall be specified through each and every Construction Plan.

Each employee will be assigned his or her own respirator. Sharing respirators is not permitted.

Dangerous Atmospheres. Written procedures and/or checklists for specific routine tasks/jobs shall be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies:

- In areas where the wearer, with failure of the respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least on additional person shall be present. Communications (visual, voice, or signal line) shall be maintained between both individuals present. Planning shall be such that one individual shall be unaffected by any likely incident and have the proper rescue equipment to be able to assist other(s) in case of an emergency; and
- When a self-contained breathing apparatus (SCBA) or hose masks with blowers are used in atmospheres immediately dangerous to life or health (IDLH), standby personnel must be present with suitable rescue equipment.

Respirators shall not be removed while inside a work area that requires respiratory protection. Employees shall be permitted to leave the work area to maintain, clean, change filters, replace parts, or to inspect their respirator if it is impeding their ability to work or if the respirator stops functioning as intended. Employees shall notify supervisor of when leaving the work area.

To assure the continuing respirator effectiveness, appropriate surveillance shall be maintained of the work area conditions and the degree of employee exposure or stress. This shall include a fit check evaluation to assure proper protection. The Site Safety Representative shall accomplish this.

Hair / Apparel. If hair growth or apparel interferes with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit before the worker is allowed to proceed with work utilizing a respirator;

Corrective Vision. If an employee wears corrective glasses or goggles or other personal protective equipment. A check shall be made to ensure that such equipment when worn does not interfere with the seal of the face piece to the face of the user. If the employees wear other safety equipment with their respirators, the employee must pass an appropriate fit test while wearing the equipment to determine a correct seal.

Corrective vision requirements (Full-Face Respirators). Full-Face respirators having provisions for optical inserts shall be reviewed. These inserts when used shall be used according to the manufacturer's specification. The face piece and lenses shall be fitted by qualified individuals to provide good vision, comfort and a satisfactory face seal.

Conventional eyeglasses shall not be used with full-face respirators. A proper seal cannot be established if the temple bars of eyeglasses extend through the sealing edge of the full face piece.

Contact lenses shall not be used with full-face respirators. Wearing contact lenses in contaminated atmospheres with a respirator shall not be allowed.

Identification of chemical cartridges is by means of its label. The secondary means is by color code. All cartridges purchased or used shall be properly labeled and/or color-coded in accordance with 29 CFR 1910.134 before they are placed into

service. The labels and colors shall be properly maintained at all times until disposal.

Color-coding. Each cartridge is painted a distinctive color or combination of colors indicated in Table 1-1 below. All colors used are such that they are clearly identifiable by the user and clearly distinguishable from one another.

**TABLE I-1 from 29 CFR 1910.134**

| ATMOSPHERIC CONTAMINANT(S) | COLOR(S) ASSIGNED |
|---|---|
| Organic vapors | BLACK |
| Acid gases | WHITE |
| Organic vapors/acid gases | YES |
| Ammonia/methylamine | GREEN |
| Multi-gases/vapors | OLIVE |
| P100 particulate | MAGENTA |
| Organic vapors/P100 | MAGENTA & BLACK |
| Acid gases/P100 | MAGENTA & WHITE |
| Organic vapors/acid gases/P100 | MAGENTA & YELLOW |
| Ammonia/methylamine/P100 | GREEN |
| Multi-gases/vapors/P100 | MAGENTA & OLIVE |

**NOTE:** GRAY is not assigned as the main color for a canister designed to remove acids or vapors.
**NOTE:** ORANGE is used as a complete body or stripe color to represent gases not included in this table. The user shall need to refer to the canister label to determine the degree of protection the canister shall afford.

## Identification of Particulate Filters

The 42 CFR Part 84 standards create three new series of particulate filters ("disposable") designated by NIOSH as **N, R,** and **P**. The N series is tested against sodium chloride (NaCl) and is limited to use in atmospheres containing non-oil based particulates. Both the R and P series are tested against dioctyl phthalate (DOP) and are intended for filtering any solid or oil-based liquid particulates.

| FILTER SERIES | FILTER TYPE DESIGNATION | MINIMUM EEFICENCY |
|---|---|---|
| "**N**" Series: **N**on-oil | N95 | 95% |
| | N99 | 99% |
| | N100 | 99.97% |
| "**R**" Series: oil-**R**esistant | R95 | 95% |
| | R99 | 99% |
| | R100 | 99.97% |
| "**P**" Series: oil-**P**roof | P95 | 95% |
| | P99 | 99% |
| | P100 | 99.97% |

## Air Quality

Compressed air, compressed oxygen, liquid air and liquid oxygen used for respiration shall be of high quality/Purity;

Oxygen shall meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen;

Cylinders of purchased breathing air shall meet at least the requirements of the specification for Type 1 – Grade D breathing air as described in Compressed Gas Association Commodity Specifications G-7.1-1989;

Cylinders of purchased breathing air should have certificate of analysis from the supplier that the breathing air meets the requirements of Type 1 – Grade D air;

Compressed oxygen shall not be used;

Oxygen must never be used with airline respirators. Breathing air may be supplied to respirators from cylinders or air compressors;

Cylinders shall be tested and maintained as prescribed in the shipping Container Specification Regulations of the Department of Transportation (49CFR PART 173 and 178);

Oxygen concentrations greater than 23.5% are to be used only in equipment designed for oxygen service distribution;

Moisture content in the cylinder shall not exceed a dew point of -50 degrees F at 1 atmosphere;

Supplied Air compressors purchased or rented by Posillico Inc. for supplying air shall be equipped with the necessary safety and standby devices. A breathing–air type compressor shall be used. The type compressor used shall be constructed and situated so as to avoid entry of contaminated air into the system and suitable inline air purifying absorbent beds and filters installed to further assure breathing air quality. The filter panel must have a tag indicating the last absorbent bed, filter change out and PM work, as well as the signature of the person authorized to perform the change. A receiver of sufficient capacity to enable the respirator wearer to escape from the contaminated atmosphere in the event of compressor failure, and alarms to indicate compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high temperature alarm is installed in the system, the air from the compressor shall be frequently tested for carbon monoxide to ensure that levels are below the exposure limit for carbon monoxide (currently 10 ppm);

Air-line couplings used shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air-line respirators with non-respirable gases or oxygen;

Compressor shall be set up to minimize moisture content; and

Breathing gas containers shall be properly marked and stored in accordance with NIOSH respirator certification standard 29 CFR 1910.101.

## Cleaning and Disinfecting

Respirators shall be regularly cleaned and disinfected using the procedures in Appendix B-1 of the Respirator standard or in accordance with the manufacturers written instructions

Respirators are required to be cleaned prior to each use, and thereafter as required;

Respirators used in fit testing and training shall be cleaned and disinfected before and after each use.

Respirator cleaning will take place prior to the shift ending.

All cleaning supplies will be provided.

The following procedure is recommended for cleaning and disinfecting respirators:

- Remove any filters, cartridges or canisters;
- Wash face piece and breathing tube in cleaner-disinfectant or detergent solution (see following paragraphs). Use a hand brush to facilitate removal of dirt;
- Rinse completely in clean, warm water;
- Wipe off excessive water, then air dry in a clean area;
- Clean other respirator parts as recommended by manufacturer;
- Inspect valves, head straps and other parts, replace with new parts if defective;
- Insert new filters, cartridges or canisters, make sure seal is tight; and
- Place in a sealable plastic bag or container for storage.

Cleaner-disinfectant solutions shall be used to effectively clean respirators The respirator should be immersed in the solution, rinsed in clean, warm water and air-dried; and

Strong cleaning and disinfecting agents can damage respirator parts. Temperatures above 185 degrees Fahrenheit and vigorous mechanical agitation should not be used. Solvents, which affect elastnomer or rubber parts, should be used with caution.

## Storage

Respirators shall be stored in a convenient, clean and sanitary location;

After inspection, cleaning and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals;

Respirators placed at stations and work areas for emergency use should be stored in weather tight compartments built for the purpose, be quickly accessible at all times and be clearly marked;

Respirators should not be stored in such places as lockers or toolboxes unless they are in carrying cases or cartons;

Respirators should be packed or stored so that the face piece and exhalation valve will rest in a normal position and function will not be impaired by the elastnomer setting in an abnormal position;

Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in “use and care” instructions usually mounted inside the carrying case lid; and

Emergency use respirators placed at stations and work areas for emergency use shall be immediately accessible at all times and shall be stored in compartments built for the purpose and in accordance with the manufacturer’s recommendations. These compartments shall be clearly marked. Instructions for proper storage of emergency respirators, such as gas masks and SCBA, can be found in use and care instructions typically mounted inside the carrying case lid.

## Routine Inspections

All respirators shall be inspected routinely before and after each use. The manufacturer’s inspection criteria shall be used as the basis for the inspection.

Emergency escape respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in working condition. Emergency escape only respirators shall also be inspected before being carried into the work area. The respirator manufacturer’s inspection criteria shall be used as the basis for the inspections. A record shall be kept of inspection dates and findings for respirators maintained for emergency use.

Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be fully charged according to the manufacturer’s instructions. It shall be determined that the regulator and warning devices function properly.

Respirator inspection shall include a check of the tightness of connections and the condition of the face piece, headband, valves, connecting tube and canisters;

Rubber or elastnomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber of elastnomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage;

Random inspections shall be conducted to assure that respirators are properly selected, used, cleaned and maintained. The respirator manufacturer’s inspection criteria shall be used as the basis for inspections. Each jobsite will identify and document the employees who will perform random inspections; and

Replacement or repair. Only the site Safety Representative or designated individual, with NIOSH approved parts designed for the respirator, shall do replacement or repairs. No attempt shall be made to replace components or make adjustments or repairs beyond the manufacturer’s recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair. Respirators that have failed inspection will be taken out of service.

***Training***

## General

For safe use of any respirator, it is essential that the user be properly instructed in his/her selection, use and maintenance and use.

Training shall be provided to each affected employee:

- Before the employee is first assigned duties that require respiratory protection and at a minimum, annually thereafter;
- Before there is a change in assigned duties;
- Whenever there is a change in operations that present a hazard for which an employee as not previously been trained;
- Whenever there is a reason to believe that there are deviations from established respiratory procedures required by this instruction or inadequacies in the employee's knowledge or use of these procedures; and
- The training shall establish employee proficiency in the duties required by this instruction and shall introduce new or revised procedures, as necessary, for compliance with this instruction or when future revisions occur.

Training topics shall include, as a minimum:

- Respiratory Protection Program;
- The OSHA Respiratory Protection standard;
- Respiratory hazards encountered within the scope of work and their health effects; whether acute, chronic or both, and an honest appraisal of what may happen if the respirator is not used;
- Need for respiratory protection and the consequences of improper fit, use, or maintenance;
- Proper selection and use of respirators;
- Inspection and seal checking of respirators;
- Limitations and capabilities of respirators;
- Respirator donning and user seal (fit) checks;
- Emergency use procedures; Classroom and field training to recognize and cope with emergencies. This will include situations where the respirator malfunctions;
- Maintenance and storage procedures;
- Medical signs and symptoms limiting the effective use of respirators;
- Explanation of why more control that is positive is not immediately feasible. This shall include recognition that every reasonable effort is being made to reduce or eliminate the need for respirators; and
- Fit Evaluation: the wearer shall be trained how to check the facepiece’s fit each time they put on the respirator by conducting a positive/negative pressure seal check as specified In appendix B -1 of the respiratory protection standard.

### *Record keeping*

The following records shall be kept at the jobsite:

Medical Evaluation Questionnaire result(s);

Fit Test Records;

Air Sampling Worksheets for each sample;

Chain of Custody for each sample;

Laboratory sample analysis for each sample;

Calculations of exposure;

Employee exposure notification records; and

Training records.

The following records shall be kept at the Corporate Safety and Environmental Department:

Medical Evaluation Questionnaire result(s);

Fit Test Records;

Air Sampling Worksheets for each sample;

Chain of Custody for each sample;

Laboratory sample analysis for each sample; and

Calculations of exposure.

*APPENDIX M*

# MONITORING INSTRUMENTS: USE, CARE, AND CALIBRATION

# MONITORING INSTRUMENTS: USE, CARE, AND CALIBRATION

## Introduction

Prior to beginning any work at Posillico sites, a preliminary site evaluation must be conducted to identify the hazards or suspected hazards of the site. Through area and personal monitoring with direct-reading instruments and personal sampling pumps, hazardous conditions can be evaluated, and the proper level of protection chosen for the specific type of work activity. Monitoring equipment used by Posillico personnel includes the following: Photoionization Detectors (PID); Personal Sampling Pumps; and, Colorimetric Tubes. This program contains a description of each type of monitoring equipment; hazards for which it can be used to monitor; Applications; Care and Maintenance; Limitations; and, Calibration.

## Scope

This program covers the use, application, care and maintenance, limitations and calibration of PIDs, Personal Sampling Pumps and Colorimetric Tubes used by Posillico employees in hazardous materials operations. Posillico employees engaged in activities involving hazardous materials includes the Hazardous Waste Division and the Air Division.

## Instrumentation

1. Photoionization Detectors (PIDs)

<u>Introduction</u>

PIDs measure a variety of gases in many industrial, as well as hazardous material, operations. These analyzers employ the principle of photoionization, which is the absorption of ultraviolet light by molecules, for detection.

The sensor consists of a sealed ultraviolet light. The energy ionizes many trace species (particularly organics) but does not ionize the major components of air, such as $O_2$, $N_2$, CO, $CO_2$, or $H_2O$. A chamber adjacent to the ultraviolet source contains a pair of electrodes. When a positive potential is applied to one electrode, the field created drives any ions, which are formed by absorption of the UV light, to the collector electrode, where the current (proportional to the concentration) is measured.

To minimize absorption of various sample gases, the ion chamber is made up of an inert fluorocarbon material, located at the sampling point, and a rapid flow of sampling gas is maintained through the small ion chamber volume.

The analyzer will operate either from a rechargeable battery for up to 10 hours, or continuously from the AC battery charger.

The useful linear range of the instrument is from a fraction of a part per million to about 2000 PPM.. A Summary of relative FID responses can be found in Attachment B. Calibration logs are in Attachment A.

Theory

Posillico utilizes the MiniRAE meter or equivalent as its PID. The MiniRAE is a portable, non-specific vapor/gas detector. The MiniRAE employs the principle of photoionization to detect a variety of chemical compounds, both organic and inorganic.

The MiniRAE contains an ultraviolet light source within its sensor chamber. Ambient air is drawn into the chamber with the aid of a small fan or positive displacement pump. If the ionization potential (IP) of any contaminant present in the ambient air is equal to or lower than the energy of the UV light source, ionization will take place, causing a deflection in the meter.

Response time for the MiniRAE is approximately 90% at 3 seconds. The meter reading is expressed in parts per million (PPM) relative to the calibration gas. All readings must be stated as equivalent readings that depend on the calibration gas being used to calibrate the MiniRAE. The calibration gas used is Isobutylene. Formerly, benzene was used as the calibration gas, but due to its hazard it is no longer used. Isobutylene, used as an equivalent in place of benzene, allows the instrument to provide results in benzene equivalents.

A list of IPs for various gases is provided in the latest edition of the NIOSH Pocket Guide to Chemical Hazards.

Basic Operation of the MiniRAE

A sample of air is drawn through a chamber and an ultraviolet light causes certain contaminants present to be broken apart into positive and negative charged particles. These charged particles are passed between electrodes and converted into an electrical impulse displayed on the readout.

Field Applications/Limitations

a. The MiniRAE will only detect organic materials with an ionization potential less than 10.2eV.

b. It is a non-specific detection device, but provides continuous information on airborne concentrations.

c. It will not respond equally to all contaminants, and does not detect methane.

d. High humidity will cause the instrument to give lower readings than the actual airborne concentration.

e. Transfer of the instrument from a cold to a warm environment may cause condensation to form on the UV light source window, causing erroneous results.

f. The readout may also be affected by electrical power lines or power transformers.

g. Total concentrations are relative to the calibration gas used (isobutylene). Therefore, true concentrations cannot be identified. And, while the instrument scale reads 0-2000 ppm, response is linear (to isobutylene) from 0-600 ppm.

h. Wind speeds of greater than 3 mph may affect the pump and readings, depending on the position of the probe relative to wind direction.

Calibration Procedure

Calibration Checklist: MiniRAE; Span gas (HNu Manufactured); Regulator; Tygon tubing.

Cleaning and Calibration Checklist: Same materials as above; MiniRAE cleaning compound; Fine screwdrivers, flat and Phillips head; Sonnicator; Drying/Toaster oven.

Inventory Items: Battery; Lamp; ION chamber; O-Rings; Screws.

a. Obtain calibration gas, Isobutylene at Span 9.8 with 10.2 eV, manufactured by MiniRAE.

b. Connect the calibration gas to the end of the probe extension. Open the gas flow valve.

c. Turn the selection knob to the 0-200 range and observe the meter needle. The concentration should read the same as that listed on the cylinder. If not, the span should be adjusted until the meter reads accurately.

d. The above procedure can be used until the span reading is approximately 5. At this time, the meter needs to be cleaned and internally calibrated. See Step 5.

e. For cleaning and internal calibration:

- Disassemble the probe, carefully removing the lamp.
- Clean the lamp.
- Clean the ION chamber and probe extension.
- Remove the instrument from its housing to expose the calibration screw, located on the side of the instrument.
- Once the probe parts have cooled (assuming it has been used), assemble the probe and connect it to the instrument.
- Connect the calibration gas to the end of the probe extension and open the gas flow.
- Turn the selection knob to the 0-200 range and observe the needle. The concentration should read the same as the concentration listed on the cylinder. If not, then the calibration screw must be adjusted with a fine screwdriver.

Maintenance and Calibration Records

a. Protect the instrument from excessive abuse, such as moisture, shock, vibration, etc.

b. Maintenance and calibration records will be recorded in a logbook specific to the MiniRAE meter. See PID Calibration Log in Attachment A.

Troubleshooting

Below are some points that should be considered if the instrument is not running appropriately:

a. Check the battery condition. Recharge it if necessary.

b. If unstable readings are obtained, a faulty probe cable or electrical connection could be the problem. To check this, hold the probe normally and flex the cable firmly. Watch the meter needle for fluctuations as the cable is flexed. Individual wires in the readout can be checked in a similar way.

c. Check the coaxial connector on the amplifier board in the probe for any separation.

d. Determine whether or not the meter is being used in close proximity to AC power lines or power transformers. This can cause the instrument to read erroneously. To check for this interference, zero the instrument in an electrically quiet area in the standby position, and then move the instrument into the area in question. If AC pick-up is a problem in the area, then the meter will indicate the magnitude of the problem.

e. No response on any setting may mean that the meter movement is broken. Tip the instrument from side-to-side. The needle should move freely and return to zero.

f. No response may mean that the electrical connection to the meter is broken. Check all wires leading to the meter and clean the contacts of the quick-disconnects.

g. No response may mean that the battery is completely dead. Disconnect the battery and check the voltage with a volt-ohm meter. Also check the 2-amp fuse.

h. If the meter responds in the BATT CHK mode, but reads zero or near zero for all other modes, the power supply may be defective.

- Replace the power supply.
- Check the input signal connection, which may be broken in the probe or readout.
- Check the input connector on the printed circuit board inside the probe. It should be firmly pressed down.
- Check the components on the backside of the circuit board. All connections should be solid and no wires should touch any other object.
- Check all wires in the readout for solid connections.

i. When the instrument responds appropriately in the "BATT CHK" and "STANDBY" positions, but not in the measuring mode, check to see that the light source is on.

j. If the instrument responds correctly in all settings, but the signal is lower than expected:

- Check the span setting.
- Clean the window of the light source.

- Check the fan for proper insertion.

k. If the instrument response is slow and/or not reproducible, either the fan is operating improperly (check the fan voltage), or the instrument needs to be recalibrated.
l. A low battery indication comes on if the battery charge is low. It will also come on if the ionization voltage is too high.

2. Colorimetric Indicator Tubes

Colorimetric indicator tubes are used to measure concentrations of specific gases and vapors, both organic and inorganic. When used appropriately, an indicator tube specific to a certain compound will produce a stain in the tube. The length of the stain (or color change) is proportional to the compound's concentration. Minimal operator training and expertise is required to operate this type of sampling instrument.

Limitations

Colorimetric indicator tubes are cross-sensitive, meaning that other compounds may trigger a similar response, which will give the user a false reading. The user must take this fact into account when he/she dealing with a situation containing unknowns.

Other limitations include individual interpretation concerning the length of the stain, the limited accuracy of the tube, and use in high humidity. The greatest sources of error occur in different interpretations that are obtained between individuals as to how far the stain has gone on the tube, and the tubes limited accuracy. Users must remember that the tubes are **25% accurate**. A simple calculation will tell the user the range in which the correct reading could possibly occur.

With this in mind, any discoloration on the tube should alert the user as to the appropriate protection required for the site. High humidity also affects the readings. Use in humid environments tends to clog the filtering medium, not allowing the gases or vapors to be drawn properly through the tube.

Maintenance and Calibration

Posillico utilizes the Draeger Model 31 Bellows-type pump for colorimetric tube sampling. General maintenance for this type of instrument includes: avoiding rough handling which may cause channeling; performing a leakage test before sampling each day (including documentation); calibrating the unit at least quarterly; providing an inventory of tubes, with expiration dates; and, appropriate storing.

Rough handling of this instrument may cause erroneous results due to channeling (leakage). Therefore, the unit must be handled carefully and not be stored outside of its protective carrying case when not in use.

It may be necessary to clean the rubber bung (tube holder) if a large number of tubes have been taken with the pump. A mild soap and water solution can be used.

Leak Test

Before each day's use, the user will perform a leak test on the instrument. This is a simple test and includes the following:

a. Squeeze the bellows of the pump and insert an unopened detector tube, attempting to draw 100 ml of air.

b. After a few minutes, examine the bellows for any expansion. Document the findings in the Site Monitoring Log Book. If the pump does not pass the leak test, it will be removed from service immediately and returned to the Facility Manager, to be sent out for repair.

Calibration Test

At least quarterly, the instrument will be calibrated for proper volume measurement. Equipment needed for the calibration test is: 100 ml burette and ring stand; stopwatch; soap solution; detector tube with both ends broken off; and, tygon tubing.

The calibration test is performed as follows:

a. Break both ends of a colorimetric tube and connect it in-line with the pump.

b. Connect the instrument directly to a bubble burette, and create a bubble inside the burette by touching the bottom of the burette to the soap solution.

c. Squeeze the bellows to exhaust all the air out of the unit.

d. Release the bellows and wait 5 minutes for the full volume of air to be drawn into the bellows. The bubble should stop between the 95 and 105 cc marks. Errors of 5% are permissible; if the error is greater than 5%, return the pump to the Facility Manager, to be sent out for repair.

Inventory and Storage Requirements

To inventory the tubes, check the expiration date marked on the storage container. No tubes will be allowed for use past the manufacturer's expiration date. A listing of tubes that are readily available will be maintained by the Health and Safety Coordinator. This list will contain the name of the tube and the expiration date of those available. The list will be updated monthly and provided to the Facility Manager and each Field Division. All colorimetric tubes will be stored in the refrigerator in the Chemical Storage Area. Refrigeration helps to maintain shelf life. Any tubes that have been previously opened and inadvertently stored in the refrigerator will not be used in the field. Colorimetric tubes are not reusable, and any reuse will result in erroneous results.

3. Personal Monitoring Pumps

Personal monitoring involves the collection of an air sample by a sampling device worn by the worker. The sampling device is worn as close as possible to the breathing zone of the individual so that the data collected closely approximates the concentration inhaled. Personal monitoring pumps are used when it is necessary to monitor the workers' exposure to air contaminants.

Personal monitoring pumps can be classified into three basic categories:

a. Low-Flow Pumps (0.5 - 500 ml/min);
b. High-Flow Pumps (500 - 4500 ml/min);
c. Dual Range Pumps.

Low-flow pumps are used for gas and vapor sampling. For example, the common flow rate for organic vapors is 200 ml/min.

High-flow pumps are used for particulate sampling as well as gas and vapor sampling. A common flow rate for fumes or dust sampling (i.e. zinc fume or asbestos) is 2 L/min.

Limitations

The major disadvantage in personal monitoring is the lag time between sampling and obtaining analysis results, which may take weeks, days or months if a remote laboratory is used. If a situation requires an immediate decision concerning worker safety, this can be a serious problem. Therefore, personal monitoring is rarely used for site characterization. Its main purpose is to assure effectiveness of work practice and engineering controls.

A second disadvantage is that multiple exposures may require the use of a variety of sampling media. Unfortunately, workers cannot carry multiple sampling media because of the added strain. Also, it is not usually possible to draw air through different sampling media using a single, portable battery operated pump. Several days may be required to measure the exposure of a specific individual to the variety of chemicals on site. Alternatively, if workers are in teams, a different monitoring device can be assigned to each team member.

Calibration

The following procedure will be used for calibration with a primary calibration source for all personal monitoring pumps used by Posillico. It has been taken from OSHA Instruction CPL 2-2.20B, Appendix 1-C, Manual Bubble Meter Technique.

Electronic bubble meters are also used as primary calibration sources. These meters have a digital read-out and the ability to give a printed copy for documentation of the pump flow rate. Posillico uses a Spectrex Model BFM-4000 for this purpose.

**NOTE**:
When calibrating with a bubble meter (either manual or electronic), the use of adapters can cause moderate to severe pressure drop in the sampling train, which will affect the calibration result. If adapters are used for sampling, then they should be used when calibrating.

a. Connect the collection device, tubing, pump and calibration apparatus (see figure 4.1).

b. Conduct a visual inspection on all tygon tubing connections.

c. Wet the inside of a one-liter burette with a soap solution.

d. Turn on the pump and adjust the pump rotameter to the appropriate flow rate setting.

e. Momentarily submerge the opening of the burette in order to catch a film of soap.

f. Draw 2 or 3 bubbles up to the burette in order to insure that the bubbles will complete their run.

g. Visually capture a single bubble and time the bubble from 0 - 1000 ml for high flow pumps or 0 - 100 ml for low flow pumps.

h. The timing accuracy must be within 1 second of the time corresponding to the desired flow rate.

i. If the time is not within the range of accuracy, adjust the flow rate and repeat steps g and h until the correct flow rate is achieved.

j. While the pump is running, mark the pump or record on the air sampling worksheet the position of the center of the float in the pump rotameter as a reference.

k. Repeat bubble timing for 3 times. Calculate the average time given by these measurements.

l. Calculate the flow rate as follows:
(NOTE: 1L = 1000 ml)

$$\frac{\text{Measured Volume (L)}}{\text{Average Seconds}} \times \frac{\text{60 Seconds}}{\text{1 Min}} = \text{L/min}$$

For Example:

$$\frac{\text{1 L}}{\text{38 sec}} \times \frac{\text{60 Sec}}{\text{min}} = \text{1.6 L/min (round to m) 2 digits)}$$

Repeat the procedures for all pumps to be used for all calibrations involving the same sampling method.

Different contaminants have different sampling protocols, which may result in different calibration protocol. Contact the Posillico Certified Industrial Hygienist or Health and Safety Coordinator for chemical-specific calibration protocols.

Checklist for Using Personal Monitoring Pumps

a. Look at measurement method in NIOSH Pocket Guide to Chemical Hazards (Latest edition).

b. Calibrate with a primary calibration source, as described in the calibration procedures.

c. Record information of air sampling worksheet and calibration logbook.

d. Make sure battery is fully charged. Air pumps have NiCd battery, which creates a memory. Care needs to be used so as to not recharge a battery that has been used for only a few hours. Recharge a battery only if it has been used for at least 8 hours. There are chargers which will completely discharge a battery before recharging; or, the pumps can be left running until the battery is rundown completely and then recharged to eliminate this memory, also.

e. Check sample requirement sheet or NIOSH method to see the minimum time/volume for the sample. An 8-hour sample period would allow for the best measure, giving an 8-hour TWA exposure.

4. Radiation Monitoring

Radiation Monitoring involves the measurement of radiation dose or radionuclide contamination for reasons related to the assessment or control of exposure to radiation or radioactive substances, and the interpretation of the results. The Geiger counter is a particle detector that measures ionizing radiation. It detects emissions of particles from Alpha, Beta and Gamma rays by the ionization produced a low pressure tube in the Geiger counter.

Limitations

There are two main limitations of the Geiger counter. Because the output pulse from a Geiger-Muller tube is always the same magnitude regardless of the energy of the incident radiation, the tube cannot differentiate between certain radiation types. A further limitation is the inability to measure high radiation rates due to the "dead time" of the tube. This is an insensitive period after ionization of the gas during which any further incident radiation will not result in a count. Typically the dead time will result in an upper count rate limit depending on the characteristic of the tube being used. Therefore ion chamber instruments are used for high radiation rates.

Calibration

Calibration is performed by the manufacturer on a periodic (usually annual) basis. The Geiger Mueller (GM) detector is capable of measuring α, β, γ, and X radiations. This instrument will measure count rates over a range of 0–500,000 counts per minute.

5. Dust/ Particle Monitoring

The following procedure will be used for calibration and maintenance with a primary calibration source for particle monitoring equipment used by Posillico. It has been taken from OSHA Technical Manual: Section 2 Chapter 3, On Site Measurements.

Application and Principle of Operation

Condensation-nuclei counters are based upon a miniature, continuous-flow condensation nucleus counter that take particles too small to be easily detected, enlarges them to a detectable size, and counts them. Sub micrometer particles are grown with alcohol vapor as they pass through a heated saturator lined with alcohol–soaked felt, and then condense the alcohol on the particles in a cooled condenser. Optics focus laser light into a sensing volume.

As the droplets pass through the sensing volume, the particles scatter the light. The light is directed onto a photodiode which generates an electrical pulse from each droplet. The concentration of particles is counted by determining the number of pulses generated. Applications include the testing of respirators and real-time dust monitors.

A counter totals individual airborne particles from sources such as smoke, dust, and exhaust fumes. Models typically operate in one of three possible modes, each with a particular application. In the "count" mode, the counter measures the concentration of these airborne particles. In the "test" (or fit test) mode, measurements are taken inside and outside a respirator and a fit factor is calculated. In the "sequential" mode, the instrument measures the concentration on either side of a filter and calculates filter penetration.

This instrument is sensitive to particles as small as 0.02 micrometers. However, it is non-specific to variations in size, shape, composition, and refractive index.

Calibration

Check the counter before and after each use in accordance with the manufacturer's instructions. This procedure usually involves checking the zero of the instrument. Annual calibration is handled through the CTC.

Maintenance

Reagent-grade isopropyl alcohol for use in these types of instruments can be obtained from the CTC Agency Expendable Supply Program.

Isopropyl alcohol must be added to the unit after 5–6 hours of operation under normal conditions. Take care not to overfill the unit. A fully charged battery pack will normally last for about 5 hours of operation. Low battery packs should be charged for at least 6 hours. Battery packs should not be stored in a discharged condition.
Storage preparation (always follow the manufacturer’s recommendations):

Dry the saturator felt by installing a freshly charged battery pack without adding alcohol. Allow the instrument to run until the LO message (low battery) or the E-E message (low particle count) appears. Some instruments allow you to remove the alcohol cartridge for storage purposes.

Remove the battery pack and install the tube plugs into the ends of the twin-tube assembly.

# ATTACHEMENT A

# PID CALIBRATION LOGS

## POSILLICO ENVIRONMENTAL, INC.

## PID CALIBRATION LOG

**IMPORTANT**: Instruments that do not pass calibration will not be used in the field. Contact the Facility Manager IMMEDIATELY for the instrument to be sent out for repair.

Model #:_____ Serial #:_____

| Date | Calibrated By | Repair Necessary (Y or N) | Initials |
|---|---|---|---|
| Span | Reading | Reading | Setting |
| | | | |
| | | | |
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# *APPENDIX N*

# *DAILY SAFETY HUDDLE FORM*

Posillico | We know how.™

## *DAILY SAFETY HUDDLE FORM*

| | |
|---|---|
| **Date:** | |
| **Job Number:** | **Job Name:** |
| **Person Conducting Huddle:** | |
| **Topics Discussed:** | |
| **Identified Hazards:** | |
| **Controls:** | |

**Sign In:**

| | |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| **(Print)** | **(Sign)** |

| | |
|---|---|
| **Supervisor Signature:** | **Date:** |

*APPENDIX O*

# SITE SAFETY AUDIT FORM

# WEEKLY CONSTRUCTION SAFETY AUDIT

DATE OF INSPECTION:_____ PROJECT NAME:

INSPECTOR: _____ PROJECT NO:

## CONSTRUCTION SAFETY CHECKLIST

| | OK | Action Needed |
|---|---|---|
| **FIRST AID AND EMERGENCY** | | |
| First aid supplies/eye wash | ❒ | ❒ |
| Certified First Aiders/CPR | ❒ | ❒ |
| Emergency Numbers Posted | ❒ | ❒ |
| Access to site Clear | ❒ | ❒ |
| **HOUSEKEEPING AND SANITATION** | | |
| Work Areas/Passageways Clear | ❒ | ❒ |
| Toilets adequate and Clean | ❒ | ❒ |
| Drinking Water Available | ❒ | ❒ |
| Waste Containers Provided & Used | ❒ | ❒ |
| **FIRE PREVENTION & PROTECTION** | | |
| Fire Hazards Analyzed | ❒ | ❒ |
| Fire Extinguishers Maintained | ❒ | ❒ |
| Adequate Fire Extinguishers | ❒ | ❒ |
| Fire Extinguishers Inspected | ❒ | ❒ |
| Proper Flammable Storage/ Use | ❒ | ❒ |
| No Open Flames | ❒ | ❒ |
| Gas Cylinders- Use & Storage | ❒ | ❒ |
| Regulators not damaged | ❒ | ❒ |
| Caps on while in storage | ❒ | ❒ |
| Cylinders secured | ❒ | ❒ |
| **PERSONAL PROTECTIVE EQUIPMENT** | | |
| Hard Hats Worn at All Times | ❒ | ❒ |
| Eye Protection Worn at All Times | ❒ | ❒ |
| Hearing Protection as Required | ❒ | ❒ |
| Respirators as Required | ❒ | ❒ |
| Medical Clearance and Fit Tested | ❒ | ❒ |
| Fall Protection ~ per the Site Plan | ❒ | ❒ |
| High Visibility Vests worn | ❒ | ❒ |
| Medical Clearance and Fit Tested | ❒ | ❒ |
| Fall Protection equip. checked daily | ❒ | ❒ |
| **ELECTRICAL INSTALLATIONS** | | |
| Electrical Dangers Posted | ❒ | ❒ |
| Temporary Lighting Adequate | ❒ | ❒ |
| Heavy Duty Adequate Wiring | | ❒ |
| ❒ | | |
| Safe/ Sufficient # of Outlets | ❒ | ❒ |
| GFCI's used properly | ❒ | ❒ |
| Cords and tools inspected daily | ❒ | ❒ |
| Circuit Breakers labeled | ❒ | ❒ |

| | OK | Action Needed |
|---|---|---|
| **LADDERS AND SCAFFOLDING** | | |
| Proper Construction/Condition | ❒ | ❒ |
| Proper placement & Secured | ❒ | ❒ |
| Guardrails/ Toeboards/Screening | ❒ | ❒ |
| Working areas free of Debris | ❒ | ❒ |
| **HOISTS, CRANES, AND DERRICKS** | | |
| Adequate Clearances | ❒ | ❒ |
| Load Capacity & Proper Usage | ❒ | ❒ |
| Clearances to Energized Equipment | ❒ | ❒ |
| Hand/Voice Communications | ❒ | ❒ |
| Swing Radius Protected | ❒ | ❒ |
| Annual Inspection Current | ❒ | ❒ |
| **EXCAVATION & SHORING** | | |
| Competent Person designated | ❒ | ❒ |
| Shoring for Soil & Depth | ❒ | ❒ |
| Spoil Bank & Equip. Distances | ❒ | ❒ |
| Access Provided | ❒ | ❒ |
| Water Controlled | ❒ | ❒ |
| Equipment Ramps Adequate | ❒ | ❒ |
| Utility Markout Completed | ❒ | ❒ |
| Utility Markout Maintained | ❒ | ❒ |
| **HANDLING AND STORAGE OF MATERIALS** | | |
| Proper Material Handling | ❒ | ❒ |
| Stacks Secure/Neat/Protected | ❒ | ❒ |
| No Excessive Heights | ❒ | ❒ |
| Stored Away From Openings | ❒ | ❒ |
| Rigging inspected by competent person | ❒ | ❒ |
| Proper Rigging selected/used | ❒ | ❒ |
| Items stacked/racked or cribbed | ❒ | ❒ |
| Rigging done by qualified person | ❒ | ❒ |
| Rigging stored properly | ❒ | ❒ |
| **MOTOR VEHICLES / HEAVY EQUIPMENT** | | |
| Brakes/ Lights/ Warning Devices | ❒ | ❒ |
| Traffic Controllers as Required | ❒ | ❒ |
| ❒ Heavy Equipment Wheels Chocked | | ❒ |
| Seat Belts Used | ❒ | ❒ |
| Daily inspection of all mobile equip. | ❒ | ❒ |
| Spotter for backing vehicles | ❒ | ❒ |
| Cabs clean of trash & debris | ❒ | ❒ |

Construction Safety Checklist

| TOOLS, HAND & POWER | OK | Action Needed |
|---|---|---|
| Proper Tool For Each Job | ❒ | ❒ |
| Daily Inspection and Maintenance | ❒ | ❒ |
| Proper Instruction In Use | ❒ | ❒ |
| All Required Guards In Place | ❒ | ❒ |
| GFCI's used on all power cords | ❒ | ❒ |

| BARRICADES AND RAILINGS | | |
|---|---|---|
| Floor Openings Protected/marked | ❒ | ❒ |
| Midrails & Toeboards in place | ❒ | ❒ |
| Open Sided Floors Protected | ❒ | ❒ |
| Trenches/ Excavations Protected | ❒ | ❒ |
| Guardrails withstand 200lb force | ❒ | ❒ |
| Scaffolds checked daily-Competent Per . | ❒ | ❒ |

| MISCELLANEOUS | OK | Action Needed |
|---|---|---|
| Safe Entrances/ Exits Provided | ❒ | ❒ |
| OSHA Act & Warning Signs Posted | ❒ | ❒ |
| Task Safety Training Provided | ❒ | ❒ |
| Public & Property Protected | ❒ | ❒ |
| Proper Welding & Cutting | ❒ | ❒ |
| Proper & Safe Demolition | ❒ | ❒ |
| Spill Containment kits on-site | ❒ | ❒ |
| Safety Nets/ Catch Platforms | ❒ | ❒ |
| Stairway Railings/ Stairs Fille | ❒ | ❒ |
| Lock Out/ Tag Out as Required | ❒ | ❒ |
| Conveyor Belts, Inspected, | ❒ | ❒ |
| Impalement Hazards Protected | ❒ | ❒ |
| Required Rebar caps in place | ❒ | ❒ |
| Mobile Equipment secured on barges | ❒ | ❒ |

| TRAFFIC MAINTENANCE | OK | Action Needed |
|---|---|---|
| Cones/Barrels/Barricades in proper position | ❒ | ❒ |
| Cones/Barrels/Barricades in good condition | ❒ | ❒ |
| Signs mounted properly | ❒ | ❒ |
| Signs visible and in good condition | ❒ | ❒ |
| Lane markings visible and in proper position | ❒ | ❒ |
| Night lighting adequate for safe operations | ❒ | ❒ |
| Arrow boards working properly and secured | ❒ | ❒ |
| Work zones secure to unauthorized entry | ❒ | ❒ |

| POWDER-ACTIVATED TOOLS | OK | Action Needed |
|---|---|---|
| Laws and ordinances complied with | ❒ | ❒ |
| Operators qualified – vendor trained | ❒ | ❒ |
| Controlled storage | ❒ | ❒ |
| Competent instructions & supervision | ❒ | ❒ |
| Inspection & maintenance | ❒ | ❒ |
| Protection of other workers | ❒ | ❒ |
| Safety goggles or face shield | ❒ | ❒ |
| Licensed for each type of tool used | ❒ | ❒ |

| CONFINED SPACE PROCEDURE | | |
|---|---|---|
| Confined Space entry training conducted | ❒ | ❒ |
| Signs posted to identify confined spaces | ❒ | ❒ |
| Personal protective equipment specified | ❒ | ❒ |
| Standby person | ❒ | ❒ |
| Emergency equipment for standby person | ❒ | ❒ |
| Permit required precautions taken | ❒ | ❒ |
| All required signatures for entry/testing | ❒ | ❒ |
| Permits posted prior to start of work | ❒ | ❒ |
| Permits retained a minimum of two years | ❒ | ❒ |

| PILE DRIVING | | |
|---|---|---|
| Proper storage of piles | ❒ | ❒ |
| Material handling controlled | ❒ | ❒ |
| Equipment inspected and maintained | ❒ | ❒ |
| Piledriving rigs properly supported | ❒ | ❒ |
| Ladders on frames and stirrups used | ❒ | ❒ |
| Cofferdams maintained and inspected | ❒ | ❒ |
| Adequate water pumping available | ❒ | ❒ |
| Tag lines used | ❒ | ❒ |
| Safety harnesses and lifelines used | ❒ | ❒ |
| Proper signaling | ❒ | ❒ |
| Barricaded as required | ❒ | ❒ |
| Ear protection area posted | ❒ | ❒ |

**ITEMS NOTED/REMARKS:**

_____

_____

_____

_____

**ITEMS NOTED/REMARKS:**

_____

_____

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_____

Was Subcontractor's work also inspected? ☐ YES ☐ NO

Did subcontractor participate in inspection? ☐ YES ☐ NO

Are any items found to be "Imminent Danger"? ☐ YES ☐ NO

_____
Inspector's Signature

_____
Project Manager's Signature

_____
Area Manager's Signature