Former Cibro Petroleum Terminal Site
Brownfield Cleanup Program Site No. C130153
Brownfield Cleanup Agreement Index No. W1-1075-05-09
Island Park, Nassau County, New York

REMEDIAL WORK PLAN

VOLUME II

APPENDICES

Submitted to
New York State Department of Environmental Conservation.
Region 1, Stony Brook, New York

Prepared for
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1750 New Highway
Farmingdale, New York 11735

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TRC Project Number: 163189

AUGUST 2012

Appendix A
Site Survey and Metes and Bounds Description

FINAL PROPERTY LINE DESCRIPTION
Description of boundary lines after the inclusion of abandonments of Canal Place, Sherman Place, the southerly part of Washington Avenue, and the 10 foot wide strip of land purported for the use of ingress and egress between the southerly side of Sherman Place and the northerly side of Wreck Lead Channel.

All that certain plot, piece and parcel of land, situate, lying and being near the City of Long Beach, and the Incorporated Village of Island Park, in the Town of Hempstead, County of Nassau and State of New York, more particularly bounded and described as follows:

BEGINNING at a concrete monument set at the intersection of the easterly side of Sheridan Place with the southerly side of Island Parkway South;

THENCE from said point of beginning running easterly along the southerly side of Island Parkway South,
South 76 degrees 46 minutes 04 seconds East, a distance of 523.76 feet to the westerly side of Island Park Canal as agreed upon in a boundary line agreement between the Town of Hempstead and Cibro South Shore Terminal Corp. as shown in Liber 9068 Page 354;

THENCE running southerly along said line bounding the westerly side of Island Park Canal and The Basin, and running westerly along said line bounding the northerly side of Wreck Lead Channel and Simmons Hassock Creek the following eleven (11) courses and distances;

(1) South 13 degrees 13 minutes 56 seconds West, a distance of 338.00 feet;
(2) South 09 degrees 29 minutes 15 seconds East, a distance of 133.16 feet;
(3) South 25 degrees 18 minutes 23 seconds East, a distance of 119.09 feet;
(4) South 13 degrees 13 minutes 56 seconds West, a distance of 101.00 feet;
(5) South 51 degrees 53 minutes 31 seconds West, a distance of 95.00 feet;
(6) North 86 degrees 21 minutes 06 seconds West, a distance of 117.25 feet;
(7) North 76 degrees 46 minutes 04 seconds West, a distance of 85.00 feet;
(8) South 88 degrees 45 minutes 00 seconds West, a distance of 170.00 feet;
(9) North 63 degrees 15 minutes 00 seconds West, a distance of 112.01 feet;
(10) North 34 degrees 16 minutes 31 seconds West, a distance of 278.94 feet;
(11) North 45 degrees 07 minutes 24 seconds West, a distance of 100.00 feet to the easterly side of lot 50 as shown on Land & Tax Map, County of Nassau, Island Park, New York and/or lands now or formerly of Louis Cramer;

THENCE running northerly along the easterly side of said lot,
North 44 degrees 52 minutes 36 seconds East, a distance of 82.00 feet;

THENCE North 45 degrees 07 minutes 24 seconds West, a distance of 26.11 feet;

THENCE North 44 degrees 52 minutes 36 seconds East, a distance of 25.95 feet to the southerly side of lot 1A, Block 215 as shown on the file map of Island Park, Long Beach, sheet #19, Map No. 605, Filed May 21, 1926;

THENCE running westerly along the southerly side of said lot, North 45 degrees 07 minutes 24 seconds West, a distance of 100.00 feet to the easterly side of Sheridan Place;

THENCE running northerly along the easterly side of Sheridan Place, North 44 degrees 52 minutes 36 seconds East, a distance of 430.00 feet to the concrete monument or said POINT OR PLACE OF BEGINNING.

Appendix B
Site-Specific Health and Safety Plan (HASP)

Former CIBRO Petroleum Terminal Site
NYSDEC BCP Site Number: C130153
7 Washington Avenue
Island Park, Nassau County, New York

HEALTH AND SAFETY PLAN
REMEDIAL ACTION WORK PLAN

Prepared by:
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TRC Project Number: 163189.0100.000

AUGUST 2012

DISCLAIMER

STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THI SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS HEALTH AND SAFETY PLAN WERE PREPARED SPECIFICALLY FOR THIS PROJECT AND SHOULD NOT BE USED ON ANY OTHER SITE OR PROJECT WITHOUT PRIOR RESEARCH AND EVALUATION BY TRAINED HEALTH AND SAFETY SPECIALISTS.

APPROVALS

This Health and Safety Plan (HASP) has been prepared to address the site field activities associated with the Former CIBRO Petroleum Terminal Site, BCP Site C120153 in Harbor Island, New York.

By their signature below, the undersigned certify that this HASP will be utilized for the protection of the health and safety of the Remediation Contractor employees participating in activities associated with the Site remediation.

Project Manager:
Organization:
Address:

Approval Date: _____

Signature: _____

Health and Safety Officer:
Organization:
Address:

Approval Date: _____

Signature: _____

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FIGURES

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Appendices

ACRONYMS

BZL	Breathing Zone Level
CGI	Combustible Gas Indicator
CRZ	Contamination Reduction Zone
DIC	Designated Incident Commander
EPA	Environmental Protection Agency
EZ	Exclusion Zone
HASP	Health and Safety Plan
HSO	Health and Safety Officer
LEL	Lower Explosive Limit
LOTO	Lockout/Tagout
NAAQS	National Ambient Air Quality Standard
NIOSH	National Institute of Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	Parts Per Million
SSC	Site Safety Coordinator
SZ	Support Zone
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This Health and Safety Plan (HASP) was designed to protect against occupational injuries and illnesses from workplace hazards, tasks and chemical exposures during remediation activities associated with the Former Cibro Petroleum Terminal Site, BCP Site C130153 (the Site).

All on-site personnel are required to read, review and strictly comply with this HASP. It is the Remediation Contractor's responsibility to ensure that the HASP is implemented and enforced. The HASP may contain sensitive or confidential information and therefore should not be disclosed to persons other than those working on site. The HASP was prepared in accordance with requirements established by the Occupational Safety and Health Administration (OSHA), the National Institute of Occupational Safety and Health (NIOSH), the Environmental Protection Agency (EPA), and New York City local laws.

The HASP will apply to remediation activities through placement of the barrier layer. Other disruptive work below the barrier layer will be subject to a HASP to be developed at a future date by the Applicants, property owner (and their contractor) or future property owners in accordance with the outline contained in the Site Management Plan (SMP).

1.1 Site Description

The Site is located at the southern terminus of Washington Avenue on Harbor Island, Nassau County, New York. It covers approximately 11.56 acres. The property is identified on Nassau County tax maps as Section 43, Block 381, Lot 35, 36, 102, 314, and 328. Surface water bodies border the Site on three sides: Island Park Canal to the east; Wreck Lead Channel to the south; and Simmons Hassock Creek to the west. Residential properties border the Site to the north and northwest, and an operating marina borders the Site to the southwest. There are no urban, commercial, industrial (other than the Site itself and marina), agricultural or recreational areas in proximity to the site on the Island Park side of Wreck Lead Channel. There are industrial and commercial uses on the south side of the Channel. The property was zoned Y Industrial District at the beginning of this BCP Project. In 2007, PDC received a zoning change from Y-Industrial to CA-Residential. Figure RAWP-1 shows the Site location.

1.2 Summary of Project Scope

The Former Cibro Brothers Terminal Facility is located at the southern terminus of Washington Avenue in Island Park, Town of Hempstead Nassau County, New York (hereinafter the "Site"). The 11.56 - acre property is identified on Nassau County tax maps as Section 43, Block 381, Lot 35, 36, 102, 314, and 328. Surrounding land use consists primarily of single-family residential properties and schools. Currently, the property is zoned Y Industrial District.

The Site was used for oil bulk storage and distribution facility from 1937 until site operations were terminated in or around 1990. Historic petroleum releases occurred during Cibro's former operations at the Site and have been investigated since 1988 when a New York State Department of Environmental Conservation ("NYSDEC") Spill Number (#88-05691) was opened. Cibro filed for bankruptcy in the same year as the opening of the Spill Case.

Blue Island Development, LLC ("Blue Island") purchased the property from the Bankruptcy Court on November 2, 2000. Posillico Development Company at Harbor Island, Inc. ("Posillico") ("the Applicant"), entered into the NYSDEC Brownfield Cleanup Program (BCP). PDC seeks NYSDEC approval for development of residential and ancillary uses of the Site.
A Supplemental Remedial Investigation (SRI) was completed by Posillico for the BCP Sites in accordance with the NYSDEC-approved in 2011. The findings of the SRI, as well as previous investigations, are summarized in the Remedial Action Work Plan (RAWP).

The project scope is detailed in the Remedial Action Work Plan (RAWP), which has been prepared to address contamination present within the BCP Stie associated with historic use of the area as an oil storage facility. The overall objective of the remediation is to prepare the BCP Site for the contemplated use, including restricted residential use and to remediate environmental conditions at the BCP Site to the satisfaction of the NYSDEC and the New York State Department of Health (NYSDOH).

1.3 HASP Revision

This HASP shall apply to all remediation tasks associated with the Site. If site conditions or work scope changes, the Remediation Contractor shall re-evaluate this HASP and revise it or develop a task-specific HASP to address the current conditions at the site if and as required.

1.4 Safety Organization

1.4.1 Safety and Planning Meetings

For routine remediation tasks, a task-specific kick-off meeting to discuss safety issues will take place to review appropriate safety issues 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. The Remediation Contractor 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

Toolbox safety talks, field inspections and periodic training will help to keep workers and supervisors continually to be aware of safe work practices, hazardous site conditions, and changes in site conditions that could alter or impact established work practices. Additional safety and planning meetings will be scheduled as needed to adequately address ongoing safety issues for the remediation of the Site.

1.4.2 Project Planning and Analysis by Phase

The Remediation Contractor is responsible for planning and implementing work in accordance with this HASP. Before a job phase begins, the Remediation Contractor is responsible for having:

- A written, predetermined safe method to carry out the job,
- Properly trained employees,
- Licenses, permits and certifications in order,
- The right equipment present in good working condition, and
- All necessary PPE.

During any particular phase of work, should new or unanticipated hazards become apparent, each employee is responsible to directly communicate this information to the Remediation Contractor Project Management.

1.4.3 Report of Accidents and Emergencies

Incidents involving injuries or property damage shall be reported to the Remediation Contractor Project Management by the Site Safety Coordinator (SSC), and accident/incident reports will be completed for accidents and incidents by those Safety Coordinators. At a minimum, the information presented in the accident/incident report form (see Attachment 12) must be provided.

1.4.4 Coordination with Government Agencies

The Remediation Contractor will be responsible to contact the NYC Fire Department, NYC Police Department, NYC Department of Buildings and Building Enforcement Safety Team Squad, as needed, to identify local requirements and obtain permits of approvals required to complete the scope of work.

In the event that a City, State, or Federal official requests entry to a work location, the following should occur:

1. The senior Remediation Contractor on-site manager or supervisor should immediately be contacted for reception of the official.

2. The Remediation Contractor Health and Safety Officer (HSO) should receive immediate notification of an OSHA inspection or other safety related visit.

3. The official should be escorted to a meeting area and an opening interview should commence.

4. Should the official walk through the Site, the senior on-site manager/supervisor and Safety Coordinator/Site Safety Manager shall escort them.

5. Documentation of the site visit should be prepared by the senior on-site manager/supervisor and forwarded to Remediation Contractor Project Management.

2.0 ASSIGNMENT OF RESPONSIBILITIES

2.1 General

Activities on or around the Site are subject to this HASP. These activities include, but are not limited to, excavation, remediation, and other support activities.

Remediation Contractor personnel will be responsible for continuous adherence to the safety procedures during the performance of this work. Deviations from the procedures or intent of the HASP will not be allowed without express consent of the site HSO, who shall coordinate significant changes with Remediation Contractor Project Management. The Project Management and field supervisor staff is responsible for ensuring that their personnel follow the established procedures in this HASP. After appropriate warning and notification, Remediation Contractor personnel who violate health and safety procedures will be dismissed from site operations. It must be remembered that the person most responsible for the health and safety of an individual is the individual him/herself.

Remediation Contractor Project Management staff will participate in periodic health and safety inspections and accident investigations; attend periodic safety meetings; and coordinate on field-approach or project scope changes that could impact the project safety program. The HSO will be informed of any changes in approach that could impact existing safety protocols.

Remediation Contractor employees will be expected to sign the Employee Acknowledgement of Site Specific Health and Safety Plan Form (see Attachment 8). Project field personnel will be required to sign an acknowledgement form indicating that they have reviewed and are familiar with the applicable task-specific HASP prior to beginning the related work.

2.2 Remediation Contractor Responsibilities

The Remediation Contractor is responsible for setting safety policies as prescribed by local, state and federal jurisdictions for all work done. The Remediation Contractor will directly manage all environmental remediation activities and will be directly responsible for the implementation of the HASP for those activities.

2.2.1 Health and Safety Health Officer (HSO)

The Remediation Contractor HSO shall be responsible for providing overall technical and administrative oversight of the health and safety program, both on site and off site. Additionally, the HSO will have the following responsibilities:

- The HSO will review and approve the HASP and any changes to the plan.
- The HSO will review, if appropriate, all subcontractor HASPs for compliance with the Remediation Contractor HASP and coordinate with subcontractor personnel, as needed, on matters regarding safety program compliance.
- If appropriate, the HSO will receive and maintain documentation from subcontractor field supervisors or Site Safety Coordinators for all safety related matters, including accident record keeping, accident investigations, safety training and certifications.

2.2.2 Site Safety Coordinator (SSC)

The Remediation Contractor's Site Safety Coordinator (SSC) will be responsible for the day-to-day safety compliance of employees, during all field activities that the Remediation Contractor directly manages. The Remediation Contractor will provide a SSC for field investigation work and remediation work that the Remediation Contractor directly manages. The SSC is a full-time member of the Remediation Contractor's field staff. Depending on the complexity of the work; the Remediation Contractor's Field Supervisor may also serve as the SSC, or a separate member of the field staff will serve as SSC. The primary duties of the SSC will include:

- Directing and implementing requirements of the HASP.
- Weekly formal and daily site inspections.
- Confirming that Remediation Contractor project personnel have been adequately trained in the recognition and avoidance of unsafe site conditions, the content of this HASP, and regulations applicable to the work in order to control or eliminate hazards or other exposure to illness or injury.
- If appropriate, authorizing Stop Work Orders to subcontractors that shall be executed upon the determination of an imminent health and safety concern.

- Contacting the Remediation Contractor Project Manager and HSO on the issuance of the Stop Work Orders when the SSC has made the determination of an imminent health and safety concern.

- Authorizing work to resume upon approval from the Remediation Contractor Project Manager and the HSO.

- Directing activities as defined in this HASP during emergency situations, subject to restrictions identified in Section 6.

- The SSC will initiate evacuation procedures when necessary, subject to restrictions identified in Section 6.

The SSC will be responsible for assessing daily site activities for compliance with provisions of the HASP. Deviations will be noted, corrected, and reported to the Remediation Contractor Project Manager and HSO. The SSC or designee will ensure that required monitoring and hazard evaluations are performed. The SSC will also ensure that site safety inspection logs and documents are maintained for inspection at the jobsite as part of the Contractor's Safety Program Evaluation (see Section 2.2.4).

2.2.3 Maintenance of Records

The Remediation Contractor will maintain records pertinent to the overall safety program as described in this HASP, including meeting minutes, accident records, safety inspection records, subcontractor evaluations, records of applicable training, and records of accident investigations.

2.2.4 Contractor's Safety Program Evaluation

If appropriate, the Remediation Contractor will periodically evaluate subcontractor safety performance. Results of this evaluation may be discussed and corrected immediately or, if immediate correction is not possible, forwarded directly to the subcontractor's office for resolution. The Remediation Contractor's Project Management and the subcontractor's Project Management will receive copies of this evaluation. The Contractor's Safety Program Evaluation form can be found in Attachment 13.

2.3 Key Personnel and Emergency Telephone Numbers

The key personnel in this project and emergency phone numbers are included in Attachment 1.

2.4 Site Access and Site Security

Access to the Site will be controlled through gated entrances to the property. During remediation, personnel will be required to sign in/out when entering or leaving the Site remedial areas. After completion of remediation, there will be no required sign in/out when entering or leaving the Site. Barrier protection will be installed around work areas as needed, for delineation of and restricting access to the work areas. For work areas of limited size, barrier tape likely would be sufficient to delineate and restrict access. For larger worker areas, temporary fencing likely would be required.

If equipment and operations are carried on outside of property boundaries, the equipment must be secured to prevent injury and property damage. All moving, hot, or hazardous equipment should be secured. Access to such hazardous operations and equipment should be restricted via use of standard guard railing. If this is not possible, a watchman shall be posted for as long as the danger exists.

3.0 STANDARD OPERATING PROCEDURES

3.1 Standard Work Practices

The following work practices and engineering controls will be used during each phase of the project. The work practices are Standard Operating Procedures, and will not be deviated from without the consent of the HSO.

3.2 Safety Inspection Program

Safety inspections are a key to compliance with safety rules, and the maintenance of safe conditions. Accidents can be a direct result of whether or not these inspections have taken place. Safety inspections will take four forms:

- Everyday inspections – results of which are to be recorded by the SSC
- Weekly inspections – formal inspections that should be recorded on a form similar to the Safety Inspection Form located in Attachment 2
- Subcontractor Evaluations – as described in Section 2.2.4
- Unannounced audits performed by the HSO and/or the Remediation Contractor's Corporate Safety Director

3.3 Accident Investigations

The purpose of accident investigations is to determine the cause of an accident so that a similar accident will not occur in the future. The Remediation Contractor shall determine the nature of such accident, record the findings, and correct the cause. An Accident/Incident report form that includes an investigation similar to that attached in Attachment 12 will be completed and maintained in the project file.

3.4 Site Hazard Assessments

Hazard assessments will be performed when particular hazards are expected to exceed local, state or federal standards. Such assessments may involve the use of air sampling, or a site survey for exposure to chemicals and gases or other physical agents such as noise or electricity. During such a survey, Personal Protective Equipment (PPE) needs must be evaluated. Refer to Attachment 3 for the current Site Hazard Assessment.

3.5 Health Risks

Potential health risks will involve exposure to chemical and physical hazards. Chemical hazards may result from storage and use of caustics, oils and fuels on the Site, subsurface contaminants and gases, silica in concrete, and other hazards. Physical hazards result from exposure to falling debris, noise, construction or drilling equipment, electricity, vehicle and machinery movement, temporary utilities, general excavation risks, and risks associated with bodies of water. Work methods, when near such exposures will need pre-planning and use of exposure limiting controls such as use of a water mist when working in dusty environments, use of analytical equipment for detection of vapors and gases, as well as the use of PPE to aid in the control of many exposures.

3.6 Fire and Explosion Safety Hazards

There are moderate fire and explosion hazards currently present on the Site. Fire and explosion hazards include exposures to explosive levels of combustible gases, the possible presence of hydrogen sulfide (H_2S) and volatile organic compounds during excavation. Volatile organic compounds are present in the soil, groundwater and possibly soil gas. Vapor, H_2S and LEL/UEL monitoring will be necessary during all on-site activities where flammable/ combustible exposures exist.

3.7 Electrical Utilities

The majority of the anticipated remediation will occur in areas where there are no known active subsurface electrical utilities. In addition, Remediation Contractor's remediation follows structure demolition and hence disturbance of any electrical utilities. If utilities are identified or off-site work is conducted, the Remediation Contractor will implement the following subsurface utility clearance procedure:

- The Remediation Contractor will review available site plans for work involving activities at or near utilities.
- For environmental drilling and other environmental investigation work, Remediation Contractor utility mark-out personnel has conducted a geophysical survey around all

sampling locations to identify subsurface electric utilities and mark the centerline of underground lines.

- Drilling or excavation personnel will notify the NYC One Call Center at (800) 272-4480, in accordance with Code 753, a minimum of 5 working days prior to any drilling or excavation on streets and sidewalks.

Workers engaged in these activities shall wear tested approved rubber gloves with leather protectors certified for the applicable voltage. Workers shall be provided with any needed insulating materials including insulating sticks, sleeves and shoes, blankets and mats rated for the work being performed where a possibility for exposure to live equipment exists. The grounding wire of the tools shall be used and the tools shall be tested before using to verify grounding is adequate and the tolls are functioning properly.

3.8 Lockout-Tagout

This procedure establishes the requirements for the lockout/tagout (LOTO) of energy isolating devices in accordance with the OSHA electrical lockout and tagging requirements as specified in 29 CFR 1926.417. This procedure will be used, as possible, to ensure that all machines and equipment are isolated from potentially hazardous energy. If possible, equipment that could cause injury due to unexpected energizing, start-up, or release of stored energy will be locked/tagged, before field personnel perform work activities.

The Remediation Contractor's SSC will serve as the authorized lockout/tagout coordinator, implement the lockout/tagout procedure and will be responsible for working with authorized site representatives to locate, lock and tag valves, switches, etc.

SPECIAL NOTE: Project personnel will assume that all electrical equipment at surface, subsurface and overhead locations is energized, until equipment has been designated and confirmed as de-energized by an authorized site representative. The Remediation Contractor will notify the designated site representative prior to working adjacent to this equipment and will verify that the equipment is energized or de-energized in the vicinity of the work location.

No project work shall be performed by Remediation Contractor personnel on or near energized electrical lines or equipment unless hazard assessments are completed in writing, reviewed by the Remediation Contractor's HSO, and clearly communicated to the field personnel.

The SSC will conduct a survey to locate and identify all energy isolating devices. They should be certain which switches, valves or other isolating devices apply to the equipment. The lockout/tagout procedure involves, but is not limited to, electricity, motors, steam, natural gas, compressed air, hydraulic systems, digesters, sewers, etc. A description of the LOTO procedure is attached in Attachment 14.

3.9 Drilling Operations

Depending on the particular drill rig employed, drilling operations can present exposure to the following:

- Flying objects (chipped asphalt or concrete, soil) and dust. Measures used to control such exposures will include use of water misting apparatus to keep dust down, or use of a guard installed around the drill to protect against flying objects and dust.

- Underground utilities present fire, electrocution, burn and explosion hazards. Positions of gas, electric and steam utility lines will be verified as described in Section 3.7. If possible, all lines in the area of drilling will be de-energized, locked-out, and tested before work begins.

- Assembling and disassembling rigs, rotary and auger drilling, and grouting.

- Perimeter protection in the form of barricades is necessary for the protection of employees and the public. Such protection will meet requirements set forth in 29 CFR 1926, as well as in the New York City Building Code, Article 19.

- All subsurface utility lines in the area of drilling will be identified jointly with the Remediation Contractor utility mark-out personnel and NYC One-Call Center.

3.10 Fall Protection

Fall protection is required when a fall hazard or a hazard of falling objects exists 6 feet above the lower level. Areas that should be protected include ramps, runways, walkways, excavations,

hoist areas, holes, leading edge work, unprotected sides and edges, roofing work, and wall openings. Control of these exposures will be provided via:

- Use of a "Controlled Access Zone" such as in bricklaying operations, where there exists a leading edge exposure. The zone may be anywhere from 6 to 25 feet from the edge. All, but authorized personnel will be restricted. The zone will be flagged or clearly marked off via use of a highly visible material that will sustain a stress of not less then 200 pounds. Control lines shall not be less than 39 inches at the lowest point or more than 45 inches at the highest point.

- Covers located in roadways and vehicular aisles that support at least twice the maximum axle load of the largest vehicle.

- Guardrail Systems – The standard guardrail shall have a top rail of 42 inches, a mid-rail of 21 inches or the installation of screens, mesh, intermediate vertical members, and a toe board. Such systems should be able to withstand a force of 200 pounds.

- Personal Fall Arrest Systems – These consist of an anchorage, connectors, and a body belt or harness. It will be rigged so that employees can neither free fall more than 6 feet or contact any lower level.

- Safety net systems as required under NYC local code, Article 19.

3.11 Confined Space Entry

The Remediation Contractor's confined space entry program has been established to set standard requirements for practices and procedures to protect employees from hazards of entry into confined spaces, as outlined in OSHA 29 CFR 1910.146. The Remediation Contractor's complete confined space entry program is included in Attachment 9.

All persons required to work in confined spaces will receive training at least annually in the following.

- Entry permit system
- Entry and rescue procedures
- Use of safety equipment
- General first aid
- Use of respirators
- Work practices as described in the Confined Space Entry Plan
- Monitoring results

Persons will be made aware of hazards associated with confined spaces. Before entering a confined space, work teams will prepare and review a Confined Space Entry Plan. Specific hazards of each confined space will be discussed.

3.12 Vehicular Traffic

When working in or near active streets, all project personnel shall wear orange safety vests. New York City requirements indicated in the codes on the work permit shall also be followed without deviation. Control procedures will include one or more of the following:

- Advance warning signs, warning flashers, message arrows or flashing arrows to alert motorists of physical conditions ahead;
- Manhole guard rails to protect personnel and pedestrians;
- Stanchions and boundary tape, barricades, cones to outline the boundaries of the work area and to limit public access;
- Signaling devices such as signal flags, signal lights and paddles to signal oncoming traffic;
- Safety vests worn by personnel to alert oncoming traffic to their presence; and
- Low intensity lights placed on barricades to outline excavations.

3.13 Protection of the Public

Provision shall be made for the care and maintenance of public thoroughfares. Sidewalks shall be kept clean and free of ice, snow and debris. Gates will open into the Site. Sidewalk sheds, and vertical and horizontal netting will be constructed in accordance with NYC Article 19 and maintained daily.

Flagmen will be utilized any time a construction vehicle interferes with traffic or crosses a sidewalk or a crane is used to lift materials over the sidewalk.

3.14 Hearing Conservation

Under the construction industry standard, the maximum permissible occupational noise exposure is 90 dbA (8-hour TWA), and noise levels in excess of 90 dbA will be reduced through feasible administrative and engineering controls (20 CFR 1926.52). To determine if noise levels have

been exceeded, dosimetry for such exposures should be conducted. Attachment 15 provides information on these procedures.

3.15 Heat Stress

Heat stress is a result of a build-up of heat in the body. This can occur when the body produces heat at a greater rate than it is dispersed by conduction, radiation, and evaporation of sweat from the surface of the skin. The internal heat of the body is brought to the surface by blood. When heat build-up occurs, the body temperature is raised causing a fever. When this condition exists it produces a cycle that further aggravates the situation. The fever causes certain body functions to accelerate. This generates excess heat that must be dispersed in addition to the normal heat generated by a person's body. Heat loss from the body is slow during conditions of high temperature and high humidity, such as a hot, humid day. These conditions, however, can be artificially caused by the wearing of non-porous, protective clothing. Therefore, caution should be exercised during field activities performed within high temperature environments.

Based on the allowable work periods (minutes per hour), a work rest regimen will be established based upon ambient conditions at the start of the job, and the acclimatization of the workforce in those conditions. Temperature extremes, as determined by a globe thermometer device (WBGT or equivalent) will require scaling back work cycles within the regimen. Greater active work times are allowable, so long as no symptoms of heat stress are noted. Heat stress symptoms are discussed in detail below.

There are three classes or types of heat stress: heat exhaustion, heat cramps, and heat stroke.

Heat Exhaustion

Heat exhaustion is brought about by the concentration of blood in the vessels of the skin. This condition may lead to an inadequate return of blood to the heart and, eventually, to physical collapse. The symptoms are:

- General weakness
- Excessive perspiration
- Dizziness
- Appearance of having fainted

- Pale and clammy skin
- Weak pulse
- Rapid and shallow breathing

To treat for heat exhaustion, place the individual in a cool place and remove as much clothing as possible. The individual should drink cool water, "Gatorade", or other similar liquid. The individual should be fanned, however, do not over cool or allow chilling. Treat the individual for shock and remove to medical facility if condition persists.

Heat Cramps

Heat cramps are usually caused by loss of salt when an individual has perspired a great deal. Drinking iced liquids quickly or in large amounts can also cause cramps usually in the leg and abdominal muscles. The systems of heat cramps are as follows:

- Pain and cramps in legs or abdomen
- Faintness
- Profuse perspiration

Heat Stroke

Heat stroke is a breakdown of the body heat-regulating mechanism causing high fever and collapse. This condition can result in unconsciousness, convulsions, and even death. Persons in poor physical condition or of advanced age are particularly susceptible. The symptoms of heat stroke are:

- Muscle twitching or convulsions
- Dry hot skin
- Flushed skin
- Suddenness of condition
- High body temperature
- Loss of consciousness
- Deep breathing, then shallow or absent
- Dilated pupils

Heat stroke is a serious condition for which an individual should be transported to a medical facility as soon as possible. In the interim the following steps should be taken. The individual

should be removed to a cool environment and the body temperature should be reduced promptly by dousing the body with water or by wrapping in a wet sheet. If ice is available, it should be placed under the arms and around the neck and ankles. Drinking water should be provided. Intake of these liquids will be monitored by supervision so as not to be excessive. Steps should be taken to protect patient from injury during convulsions, especially from biting the tongue.

To avoid problems from heat stress during conditions of high temperature and humidity, supervisors should insure that the employees drink plenty of fluids; should provide breaks in accordance with the previously outlined guidance and monitoring; and should revise work schedules as necessary to take advantage of the cooler parts of the day. Some basic guidelines for maintaining workers' body fluids at normal levels during conditions of high temperature and humidity are as follows:

- Have workers drink 16 ounces of fluid before beginning work.
- Have workers drink 4 to 8 ounces of fluid every 15 to 20 minutes, or at each scheduled break. A total of 1 to 1.6 gallons of fluid per day are recommended, but more may be necessary to maintain body weight.

To measure the effectiveness of the heat recovery rest periods, the employee heart rate should be monitored as follows:

- Count the pulse rate for the last 30 seconds of the first minute of a three-minute period, the last 30 seconds of the second minute, and the last 30 seconds of the third minute.
- Double the count to obtain an equivalent one-minute rate.

If the first rate is less than 100 beats/minute and the second two readings are at least 10 beats/minute less than the previous reading than the rest periods should be considered adequate. Otherwise, the rest periods should be extended.

Another method of measuring the effectiveness of the rest periods is to take oral temperatures. If body temperature exceeds 100°F, then the rest periods should be extended.

If heat stress may be a factor due to ambient temperature and humidity, then it is recommended that both methods be used. In addition, these tests should be performed in the morning prior to any work to establish a background level.

3.16 Cold Stress

The single most important aspect of hypothermia (cold stress) is the fall in the deep core temperature of the body. Workers should be protected from exposure to cold so that the deep core temperature does not fall below 36°C (96.8°F). Lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision-making, or loss of consciousness.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 35°C (95°F). This must be taken as a sign of danger to the workers and exposure to cold should be immediately terminated for all workers when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Since prolonged exposure to cold air at temperatures well above freezing can lead to dangerous hypothermia, whole body protection must be provided. Adequate insulating clothing to maintain core temperatures above 36°C must be provided to workers if work is performed in air temperatures below 4°C (40°F). In addition, it should be kept in mind that, the higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required. Special protection of the hands is required to maintain manual dexterity for the prevention of accidents:

- If fine work is to be performed with bare hands for more than 10-20 minutes in an environment below 16°C (60°F), special provisions should be established for keeping the workers' hands warm. Metal handles or tools and control bars should be covered with thermal insulating material at temperatures below -1°C (30°F).

- If the air temperature falls below 16°C (60°F) for sedentary, 4°C (40°F) for light, -7°C (20°F) for moderate work and fine manual dexterity is not required, then the workers must use gloves. Winter "Monkey-grip" gloves consisting of a cotton lining with a textured PVC coating are typically used in cold weather. To prevent contact frostbite, the workers should wear anti-contact gloves.

Provisions for additional body protection is required if work is performed in an environment at or below 4°C (40°F). The workers shall wear cold protective clothing appropriate for the level of cold and physical activity:

- If the air velocity at the job sites is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind shall be reduced by shielding the work area, or by wearing an easily removable outer windbreak layer garment.

- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of the clothing in use may be of a type impermeable to water. With more severe work under such conditions, the outer layer should be water repellent and the outerwear should be changed as it becomes wetted. The SSC should assure that adequate replacement garments are available for use by the employees.

- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, the SSC can suspend work on the Site until adequate clothing is available or until weather conditions improve.

- Workers handling evaporative liquids (gasoline, alcohols, solvents, etc.) at air temperatures below 4°C (40°F) shall take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

3.17 Biological Hazards

There may be a possible hazard arising from poisonous plants, such as poison ivy, and from some animals, such as snakes, rats, and insects such as ticks. Remediation Contractor personnel shall avoid all contact with animals.

All Remediation Contractor personnel will be trained to identify poison ivy during the preliminary site safety meetings.

Insects, including ticks, bees, wasps, hornets 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. Personnel that have been bitten or stung by an insect at the Site should notify the Remediation Contractor HSO of such immediately. The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and or as often as needed throughout the shift.
- Wear proper protective clothing (work boots, socks and light colored pants).
- When walking in wooded areas, to the extent possible avoid contact with bushes, tall grass, or brush.

Field personnel who may have insect allergies (i.e., bee sting) should provide this information to the Remediation Contractor HSO or his designee prior to commencing work, and shall have allergy medication on Site.

The Remediation Contractor HSO will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the Site.

Mosquitoes infected with the West Nile Virus have been identified in the New York City Metropolitan area. Field personnel will acquaint themselves with the symptoms associated with West-Nile Virus and will contact a physician, as well as the Remediation Contractor HSO, if the disease is suspected.

Lyme disease is caused by infection from a deer tick that carries a spirochete. During the painless tick bite, the spirochete may be transmitted into the bloodstream, which could lead to the worker contracting Lyme disease. This flu like illness commonly happens between May and October when ticks are more active. Symptoms can include a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. Early signs may include an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems as well as a disabling type of arthritis. If personnel feel sick or have signs similar to those above, they should notify the HSO immediately.

It is recommended that personnel check themselves when in areas that could harbor deer ticks, wear light color clothing and visually check themselves and their buddy when coming from wooded or vegetation-covered areas. If a tick is found biting an individual, the HSO should be contacted immediately. The tick can be removed by pulling gently at the head with tweezers. The affected area should then be disinfected with an antiseptic wipe.

3.18 Working Over or Near Water

Remediation Contractor personnel working over or near water, where the danger of drowning exists, shall wear U.S. Coast Guard-approved life jacket or buoyant work vests. A warning indicator consisting of snow fence, string with flagging, or other approved equal shall generally be placed and maintained at a distance of approximately ten feet from the water's edge in areas of bulkhead replacement. When the warning indicator needs to be removed (partially) to facilitate access for personnel or equipment performing a near water work activity, workers performing the subject work activity shall wear life jackets or buoyant work vests.

Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal safety protection will be required during all site activities at most of the site locations unless information is obtained indicating that contaminants are not present. Conditions may develop that would require increased protective measures that would require the HSO/SSC to stop operations and evaluate the situation. Respirators may be needed on this project. It is anticipated that most work will be performed under Level D protection that consists of the following:

Level D

a) Work uniform (overalls)
b) Steel-toe work boots
c) Hard hat
d) Safety glasses
e) Hearing protection
f) Gloves
g) Orange Safety Vests (working in or near streets)

If excessive vapors are detected at action levels (See Section 8.2) or direct contact with grossly contaminated media is expected, workers will upgrade to Level C protection. Level C protection consists of the following:

Level C

a) Full body disposable suits appropriate for chemical resistant exposure
b) Chemical resistant work boots
c) Hard hat
d) Safety glasses
e) Hearing protection
f) Inner and outer chemical resistant gloves
g) Half-face or full-face Air Purifying Respirator, with appropriate cartridge
h) Orange Safety Vests (working in or near streets)

Level B protection is required when the atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection. Level B protection consists of the following:

Level B

a) Full body disposable suits appropriate for chemical resistant exposure
b) Chemical resistant work boots
c) Hard hat
d) Safety glasses
e) Hearing protection
f) Inner and outer chemical resistant gloves
g) Pressure-demand, full-face piece SCBA or pressure-demand supplied-air respirator with escape SCBA
h) Two-way radio communication

Level A protection is required when the chemical substance requires the highest level of protection; and gases and vapors pose a hazard should skin contact occur. Level A protection consists of the following:

Level A

a) Fully encapsulating, chemical resistant suit
b) Chemical resistant work boots
c) Hard hat
d) Inner and outer chemical resistant gloves
e) Pressure-demand, full-face piece, SCBA or pressure-demand supplied-air respirator with escape SCBA
f) Two-way radio communication

All workers will change clothes at the end of the work shift to minimize bringing potentially contaminated soil off site and to reduce cumulative build-up in personal vehicles. Boots will be changed prior to leaving the site to reduce tracking of soil off-site. This procedure prevents workers from bringing impacted materials off site. Personal lockers or storage boxes for storage of work clothes are recommended. If disposable coveralls are used, they will be collected in 55-gallon drums on-site for periodic disposal, as specified in the Work Plan.

5.0 TRAINING

5.1 Site Training Requirements

The following training requirements shall be addressed for Remediation Contractor employees. Copies of all training rosters and agendas, and required training certificates shall be forwarded for the review of the HSO.

- HAZWOPER – for those employees involved in site remediation operations
- Hazard Communication Training
- Emergency Evacuation
- Respirator Protection – for those workers required to use respirators
- Confined Space Entry – for those workers involved in such situations
- Personal Protective Equipment Training
- Hearing Conservation
- Trade Specific Requirements

The HSO and SSC and other supervisory personnel must have attended additional site-specific training to:

- Ensure maximum regard for the health and safety of all employees, the public, and the environment;
- Comply with all laws, rules, and regulations required to safeguard the health and safety of all employees, the public, and the environment;
- Increase the ability of employees to react responsibly and safely under normal conditions and during emergency situations; and
- Educate personnel relative to potential site hazards, adverse chemical effects, and the importance of good safety and industrial hygiene practices.

Formal safety training programs will be held periodically to refresh employees' health and safety awareness.

5.1.1 HAZWOPER Training

Remediation Contractor employees involved in soil excavations and management must have 40-hour HAZWOPER Training as defined in OSHA 29 CFR 1926.65 and 29 CFR 1910 and based on a written site analysis. Certificates of completion of HAZWOPER training for those workers

requiring it must be presented to the HSO, and maintained in the project file for the duration of the project. Copies of the training certificates will be placed in Attachment 4.

5.1.2 Hazard Communication Training

Workers will be trained prior to the start of a job in accordance with 29 CFR 1926.59. Workers will receive training for exposure to chemical contaminants, as well as for chemicals brought in on the job. Chemicals to be brought to the job must receive the approval of the Remediation Contractor Project Manager, HSO and SSC prior to use, including the provision of MSDS sheets prior to use. The SSC, HSO, and the Remediation Contractor Project Manager must be made aware of any changes made with regard to chemical use on the job. Refer to Attachment 10 for the formal Hazard Communication Plan.

5.1.3 Emergency Evacuation Training

In every location where a crew may be located, an emergency evacuation procedure must be in place. This means that at least two routes of egress from an area must be located, and a designated assembly area identified. The SSC or a field supervisor for each new location must relay this information to all workers before work begins.

5.1.4 Respirator Protection Training

In areas where respiratory protection is required, employees are required to have annual training and documentation completed. This is only a part of other requirements mandated to include a medical clearance and respirator fit testing. Please refer to Attachment 11 for the Respiratory Protection Program.

5.1.5 Confined Space Entry Training

Training required for workers involved with confined spaces is an annual requirement. Persons will be made aware of hazards associated with confined spaces. Before entering a confined space, work teams will prepare and review a Confined Space Entry Plan. Specific hazards of each confined space will be discussed. The Confined Space Entry Program is attached in Attachment 9.

5.1.6 Personal Protective Equipment Training

Workers are required to have this training at least initially before beginning work at a particular job requiring PPE. PPE training is again required when the job task changes and different chemical or physical exposures are encountered. Employers should keep records of all training and any updated training efforts. These records shall be available to the HSO for review.

5.1.7 Hearing Conservation Training

For those employees exposed to an 8-hour time-weighted average noise exposure of 90 dbA or more, hearing conservation training is required on an annual basis. Additionally, annual medical evaluations and engineering corrections and/or provision of hearing protection is necessary. Exposures to impulse/impact noise shall not exceed a 140 dbA peak sound pressure level.

5.1.8 Trade Specific Requirements

Specialized training shall be provided when serious hazards are present for which employees lack the specific training to do the job safely. Examples of this would include Electrical Safety training needed for the unusual circumstances presented in this project.

5.2 Tool Box Safety Talks

Toolbox safety talks will take place before the job begins, in order to review:

- Best methods used for tasks scheduled that day, tool selection, and anticipated problems.
- Each worker will be provided access to a copy of the site safety plan and the plan will be reviewed with each worker performing work on site.
- Workers assigned a respirator shall have been fit-tested with their individual respirator. Fit testing will be performed in accordance with 29 CFR 1926.1128. (Fit testing will occur only if it is determined that an upgrade to Level C PPE is required, and will occur prior to Level C work.).
- On-site personal hygiene will be reviewed to prevent contaminants from being brought off site on clothing or footwear.
- Decontamination procedures will be reviewed and demonstrated when necessary.

- Emergency procedures including emergency alarms and exits will be reviewed.
- A review of the area(s) that will be classified as restricted access area(s) and the methods employed to designate these areas.

6.0 EMERGENCY PROCEDURES

Should outside assistance be needed for accidents, fire, or release of hazardous substances, the emergency numbers will be available and posted at the site (see Attachment 1) where a readily accessible telephone is made available for emergency use.

Also, in the event of an incident where a team member becomes exposed or suffers from an acute symptom from contact with site materials and has to be taken to a hospital, a short medical data sheet for that individual will be made available to the attending physician. The medical data sheet will include the following:

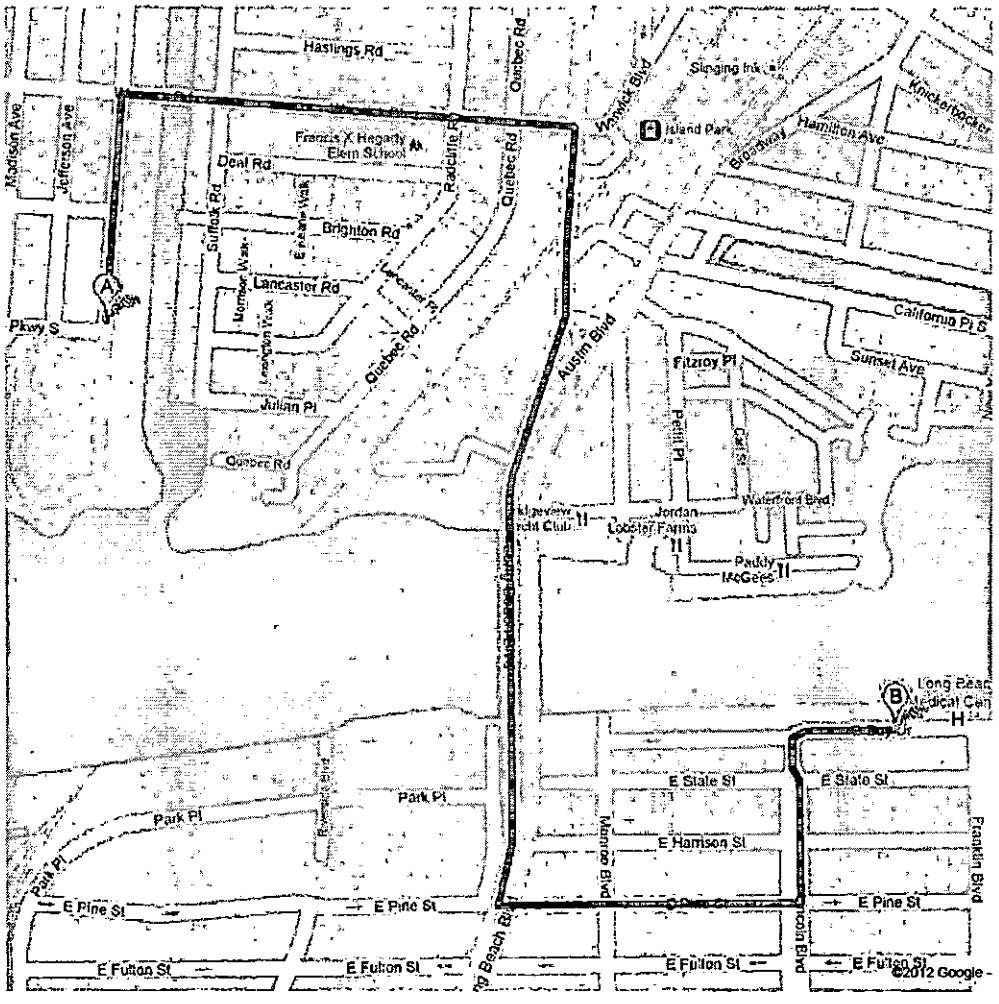
- Name, address, home phone
- Age, height, weight
- Name of person to be notified in case of an accident
- Allergies
- Particular sensitivities
- Does he/she wear contact lenses
- Short checklist of previous illness
- Name of personal physician and phone
- Name of company physician and phone
- Prescription and non-prescription medications currently used.

A sample medical data sheet is included in Attachment 5. A map showing the directions to the two nearest hospitals is included as Figure 6-1.

6.1 Emergency Site Evacuation Procedure

In the event that an emergency situation arises, including but not limited to fire, explosion or significant toxic gas release into the ambient atmosphere, the SSC will implement an immediate evacuation of all project personnel due to immediate or impending danger.

Figure 6-1
Directions to
Long Beach Medical Center
455 East Bay Drive
Long Beach, New York 11561
516.897.1000



Driving Directions:	**Distance (miles)**
1. Head north on Washington Ave toward Brighton Blvd	0.2 mi
2. Take the 1st right onto Warwick Blvd	0.4 mi
3. Turn right onto Long Beach Rd	0.6 mi
4. Turn left onto E Pine St	0.2 mi
5. Take the 2nd left onto Lincoln Blvd	0.1 mi
6. Turn right onto E Bay Dr, Destination will be on the right	

The SSC or Field Supervisor will serve as the Designated Incident Commander (DIC). After the emergency has been resolved, the DIC will indicate when staff should resume their normal duties. If dangers are present for those at the designated assembly point, another designated location of assembly will be established.

It will be the responsibility of the SSC or Field Supervisor to report a fire or emergency to Remediation Contractor Management, assess the seriousness of the situation, and initiate emergency measures until the arrival of local fire fighters or other first responders, should they be necessary. The SCC, working with Remediation Contractor Management, may also order the closure of the site for an indefinite period as long as it is deemed necessary.

Under no circumstances will incoming visitors be allowed to proceed to the area of concern, once an emergency evacuation has been implemented. Visitors or other persons present in the area of the emergency shall be instructed to evacuate the area. The SSC will ensure that access roads are not obstructed and will remain on site to provide stand-by assistance upon arrival of emergency personnel.

If it is necessary to temporarily control traffic in the event of an emergency, those persons controlling traffic will wear proper reflection warning vests until the arrival of police or fire personnel.

6.2 Alarms

Air horns shall be kept on site by each work crew or in each work area for use as an alarm system. Five short air horn blasts will be used to signal an emergency and immediate site evacuation at sites.

6.3 Routes of Egress

Exit facilities shall be indicated on site plans. At least two paths of egress shall be kept functional for all work locations, and these paths shall be discussed during the tool box meetings. Before a job begins in a new location, training shall be initiated to inform workers of at least 2 paths of egress.

6.4 Designated Assembly Locations

Personnel will evacuate the site and assemble at a designated assembly location. The assembly locations for each property will be communicated during the toolbox meetings.

6.5 Accounting for Personnel

Remediation Contractor supervisors are responsible for the accounting of all personnel assembled at the designed assembly areas. The Designated Incident Commander shall be notified if personnel are not found.

7.0 MEDICAL PROCEDURES

Remediation Contractor employees will be required to complete the Employee Medical Data Sheet (see Attachment 5). This sheet is especially useful should a worker become non-coherent as the result of an accident. It should be given to hospital staff providing them valuable medical data.

7.1 Physical Examination Documents

Employees whose work assignments require their presence at a hazardous work site will have a baseline medical evaluation prior to commencement of hazardous work activity. The baseline medical evaluation consists of the following [*=Required; •=Preferred]:

* * Medical and Occupational History
* * Physical Examination
* * Pulmonary Function
* * EKG (over 40 years of age)
* • Urinalysis
* • CBC (with differential and RCB) Chem 24 (SMAC)
* • RBC Cholinesterase
* • Urine Heavy Metal Panel
* • Blood Lead with zinc protoporphyrin (zpp)
* • Chest X-Ray (2-view)
* • Audiometry

The annual medical evaluation consists of the following [*=Required; •=Preferred]:

* * Physical Examination and History
* * Pulmonary Function
* • Urinalysis
* • CBC (with differential and RCB) Chem 24 (SMAC)
* • RBC Cholinesterase
* • Blood Lead with zpp
* • EKG (Over 40 years of age)
* • Audiometry

Additional tests that may be performed as part of the annual examination include the following [*=Required; •=Preferred]:

- Cholinesterase - plasma
- Urine - heavy metal
- Blood - PCB
- Chest X-Ray (2-view)

Based upon this examination and a review of the employee's job description, the physician identifies any medical restrictions that would affect an employee's ability to safely perform his/her job. If no restrictions are imposed, the physician certifies the employees as capable of full participation in the work program. A form such as the one attached in Attachment 6, Medical Evaluation Form, will be used.

If an employee suspects exposure to a toxic chemical or other hazard while performing project tasks, additional tests may be ordered immediately following the exposure period. Individuals are encouraged to discuss changes in their health status with their respective corporate safety manager and/or physician.

7.2 Access to Exposure and Medical Records

Instructions regarding the existence, location, availability of employee medical records shall be provided to the employee for all medical exams conducted as a result of their employment, and at least annually. Employee access to records shall be provided in a reasonable time, place and manner, but on no event later than fifteen days after the request is received.

7.3 Physical Examination and Respirator Approval

Each employee required to wear a respirator will obtain medical clearance from a physician for the respirator type to be used before wearing such respiratory protection. Additionally, each employer must select a respirator acceptable for use and that will provide the correct protection for the specific exposure. The employer is responsible for administering fit tests for all new respirators used by employees, and must administer training on a yearly basis.

7.4 Emergency First Aid

All accidents or near miss incidents will be dealt with in a manner to minimize further injury to the individual or others. In the event that an accident does occur, the following general procedures will be followed:

- First aid and other appropriate action shall be given by the qualified individual closest to the event.
- Contact hospital and arrange for ambulance if necessary.
- Should the individual require hospital treatment, forward a copy of the Employee Medical Data Sheet (see Attachment 5), to provide needed information to the medical staff.
- As soon as practicable, the incident shall be reported to the HSO and the Project Manager. The SSC and the HSO, shall be responsible for making all decisions concerning treatment, and/or other appropriate action.

The accident investigation reports/forms as provided in Attachment 12 will be completed and forwarded to the Remediation Contractor SSC and HSO and will be kept in the project file.

7.5 Emergency Medical Procedures

Should an accident occur during a job related activity in which personnel are injured, the following actions will be taken:

- The SSC will assume control, and will notify emergency personnel by calling 911 to request an ambulance.
- The SSC will designate a person to flag down the ambulance and direct it to the injured person.
- Companion personnel who are unaffected by the incident or personnel partially dressed in protective gear but outside the work zone will be alerted to rescue any workers whose health or safety is endangered.
- Under no circumstances shall rescue be attempted without first obtaining help, and re-assessment of hazardous conditions.

- The buddy system will be enforced. Victims will be located and their conditions will be assessed. If possible, the hazardous situation will be brought under complete or temporary control and victims will be assisted or removed from the area.

- The SSC will determine, based on the type and severity of the illness or injury, whether or not to decontaminate the victim, and whether the victim needs to be stabilized.

- Should the individual require hospital treatment, forward a copy of the Employee Medical Data Sheet, attached in Attachment 5, to provide needed information to the medical staff.

The SSC will insure that well-stocked first aid kits are present at the work site at all times. Portable eyewash units or low-pressure hoses will also be maintained at the work area.

7.6 Accident and Injury Report Forms

7.6.1 Accident/Incident Report

All injuries, no matter how slight, shall be reported to the SSC. An accident/incident report form (see Attachment 12) will be filled out on all accidents by the applicable Remediation Contractor supervision personnel or the SCC. Copies of all accident/incident reports shall be kept on site and available for review. Project personnel will be instructed on the location of the first-aid station, hospital, doctor and ambulance service near the job. The emergency telephone numbers will be conspicuously posted in site vehicles near the work zone. First-aid supplies will be centrally located and conspicuously posted between restricted and non-restricted areas to be readily accessible to all on the site.

7.6.2 First Aid Treatment Record

The form located in Attachment 7(GI) will be used for recording all non-lost-time injuries treated by the project first-aid attendant, the local physician or hospital will be entered in detail on this record. "Minor" treatment of scratches, cuts, etc. will receive the same recording attention as treatment of more severe injuries.

7.6.3 Occupational Injuries and Illnesses Form

A report of recordable occupational injuries and illnesses as required by the regulations issued under OSHA shall be recorded on the OSHA 300 form (see Attachment 7(G3)). A recordable injury or illness is one that requires more than first-aid treatment. Occupational injuries and illnesses shall be recorded within 48 hours of a recordable case as required by statute. This is the responsibility of the employer, and will be recorded by the SSC, or designate, in so far as reportable injuries/illnesses happen to on-site employees. Copies of OSHA 101 (see Attachment 7(G2)) forms shall be sent to the HSO. It shall be the responsibility of the HSO to complete and keep up to date the OSHA log 300 form (see Attachment 7(G3)) for their respective employees on-site. Entries into this form must be within 48 hours.

The HSO, SSC and Remediation Contractor Project Management staff reserves the right to review OSHA First Report of Injury and 300 forms.

8.0 ENVIRONMENTAL CONSIDERATIONS

8.1 Hazardous Substance Assessments

Hazardous Substance Assessments are to be completed for each phase of work as required by OSHA, 29 CFR 1926.65. Where there is a possibility of an exposure to employees of a hazardous discharge, procedures necessary to guard against an occurrence will be discussed at the weekly safety meetings.

8.2 Site Air Monitoring

An essential component in maintaining low exposure to site workers is air monitoring of work operations. The primary contaminants that have been identified at the Site during previous site investigations are constituents of weathered petroleum, specifically, non-targeted volatile organic compounds (VOCs) and non-targeted semivolatile organic compounds (SVOCs). Polycyclic aromatic hydrocarbons (PCBs), metals and have been detected and are expected to be present at drilling and excavation locations. At some isolated locations, targeted volatile organic compounds (VOCs), targeted semivolatile organic compounds (SVOCs), metals, and polychlorinated biphenyls (PCBs) have been found in the soil and/or groundwater. Real-time dust monitoring will be conducted using a Mini Real-Time Aerosol Monitor (Mini RAM), DataRAM or similar instrument. Site air monitoring also will include utilizing a Photoionization Detector (PID). Sampling will be performed upwind and downwind of the work area and will be recorded in the site log and used to determine if excessive dust levels are present on-site and off-site. The SSC or an air-sampling technician will perform air monitoring. Based on the results of the air monitoring, the HSO will decide on upgrading dust control measures.

8.2.1 Community Air Monitoring Plan

The proposed CAMP monitoring for the Site will be performed at the upwind and downwind perimeter of the Site during remediation phase ground intrusive activities. At both the upwind and downwind end of the Site, air monitoring will include continuous, real-time air monitoring for particulates measuring less than 10 micrometers in size (PM-10). At the downwind end of the Site, periodic, real-time air monitoring for VOCs will occur. In areas of VOC and SVOC contamination, real-time air monitoring for VOCs will be conducted continuously.

The response levels and actions for the air monitoring will follow the GCAMP protocol:

- If VOC levels > 5 part per million (ppm) over a 15-minute, running average = work activities to be temporarily halted;
- If VOC levels > 5 ppm but < 25 ppm of VOCs = work activities halted; source identified, and corrective actions taken to abate VOC emissions so that VOC levels are less than 5 ppm;
- If VOC levels >25 of VOCs = site activities will be shut down, and the source of the VOC contamination will be investigated and appropriate corrective action will be taken;
- If downwind PM-10 particulate levels >100 micrograms per cubic meter ($\mu g/m^3$) above background (upwind) = work stopped and resumed only after dust suppression measures are implemented and downwind PM-10 particulate levels are < 150 $\mu g/m^3$ above background; and,
- If downwind PM-10 particulate levels > 150 mcg/m3 above background after dust suppression, work will be stopped, and a reevaluation of activities initiated. Confirmatory air samples will be collected at the downwind and upwind site perimeter and analyzed for lead, arsenic, and PAHs.

If warranted by air monitoring results, additional dust suppression measures will be implemented. This could include any of the following:

- Applying water
- Wetting equipment
- Spraying work area
- Utilizing alternate methods

Background air monitoring will be performed prior to the start of the workday. Sampling will be performed at an upwind location at the property boundary for a minimum of fifteen minutes. Sampling will be performed continuously at downwind locations. Monitoring results will be kept in a logbook and used to initiate additional dust control measures as necessary.

8.2.2 Exclusion Zone Monitoring for Worker Health and Safety Determinations

Atmospheric air monitoring results are used to provide data when exclusion zones need to be established and when certain levels of personal protective equipment are required. For all instruments; there are site-specific action level criteria which are used in making field health and safety determinations. Other data, such as the visible presence of contamination or the steady state nature of air contaminant concentration, are also used in making field health and safety decisions. Therefore, the SSC, with the approval of the HSO, will establish an exclusion zone or

require a person to wear PPE although atmospheric air concentrations are below established HASP Action Levels.

Real-time air monitoring will be conducted for volatile organic compounds (VOCs), combustible and toxic gases and vapors, oxygen, and dust levels. A photoionization detector (PID) will be used to monitor airborne VOC concentrations at breathing zone levels during intrusive work. A combustible gas indicator (CGI) will be used in conjunction with an oxygen/hydrogen sulfide/carbon monoxide detector to monitor for the presence of combustible/toxic gases and oxygen deficiency or enrichment when the work involves subsurface soil or confined space entry. Dust monitoring will be accomplished with a Mini RAM or Data RAM aerosol monitor during invasive procedures that have the potential for creating airborne dusts, such as coring and drilling, or excavation work. Toxic gas or vapor monitoring may be augmented by the use of direct reading air indicator tubes. Air monitoring will be the responsibility of the SSC or designee. Manufacturers' instructions for operation and calibration will be available on-site. The following table lists general air monitoring action levels. These action levels are subject to modification to accommodate site-specific and task-specific conditions.

Table 8-1
Air Monitoring Action Levels

Instrument	Reading	Level of Personal Protective Equipment/Action
Photoionization Detector (PID)	Background to 1 part per million (ppm) of total VOCs, non-transient above background at breathing zone level (BZL)	D
PID	> 1 ppm, non-transient above background of total VOCs in BZL	Use detector tube to measure benzene concentration
PID	1 to 5 ppm confirmed benzene concentrations with detector tubes, in BZL	C/notify HSO
PID	1 to 25 ppm of Total VOC, non-transient above background (confirmed absence of benzene) in BZL	D
PID	> 25 and ≤ 250 ppm of Total VOC (confirmed absence of benzene), non-transient above background in BZL	C/notify HSO
PID	> 250 ppm of Total VOC, non transient above background in BZL	B/institute vapor suppression measures
Combustible gas indicator (CGI) with oxygen (O_2) meter	> 5 % Lower Explosive Limit (LEL), < 10% Upper Explosive Limit (UEL), in borehole	Proceed with caution
CGI/ O_2 meter	> 10 % LEL in borehole	Stop work, allow to vent
CGI/ O_2 meter	> 5 % LEL, <10% UEL in BZL	Limit activities to those which

Table 8-1 Air Monitoring Action Levels		
Instrument	**Reading**	**Level of Personal Protective Equipment/Action**
		do not generate sparks
CGI/ O_2 meter	> 10 % LEL in BZL	Stop work, allow to vent
Aerosol monitor	Background to 50 micrograms per cubic meter ($\mu g/m^3$) 15 minute average	D
Aerosol monitor	> 50 $\mu g/m^3$ 15 minute average	C
Sound Level Meter	> 90 decibels, A scale (dbA)	Don hearing protection
Hydrogen Sulfide Meter	> 5 ppm	Stop work, allow to vent or change work practices

8.2.3 Personal Air Sampling Requirements

When exposure to chemical or physical contaminants are suspected due to employee proximity to the hazards, or due to a smell or appearance in areas of work, personal air sampling is required to evaluate employee exposure as part of a Hazard Assessment mandated by OSHA. Since air monitoring for specific chemicals involves the use of approved air monitoring methods and laboratory analysis, only qualified industrial hygienists or safety professionals should perform such measurements.

8.3 Demarcation of Zones

Site zones are intended to control the potential spread of contamination throughout the Site 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 will be established at the work site when operations begin. Appropriate barrier tape and signage will be used to designate exclusion zones.

8.3.1 Exclusion (Work) Zone

Work zones for activities that require demarcation by zones (i.e., EZ, CRZ and SZ) will be separated with appropriate barriers. Only authorized personnel will be allowed access into the work zones. Appropriate safety criteria associated with these zones will be followed.

8.3.2 Decontamination Zone

Decontamination areas where personnel and equipment decontamination procedures will be performed, if appropriate, will be located as close as possible to work areas. Appropriate barriers and signs will demarcate these areas and unauthorized personnel will be excluded. Decontamination could be necessary if contaminated materials are uncovered or spills occur.

8.3.3 Site Control

In the event of a chemical or hazardous substance release/spill, the DEC must be immediately notified. A spill cleanup will commence under the DEC's supervision. All personnel involved with spill response and notification must have the appropriate HAZWOPER training.

Any person working in an area where the potential to exposure to site contaminants exists will only be allowed to access that area after providing the SSC with proper training and medical evaluation documentation.

The zones will be based upon current knowledge of proposed Site activities. The zone configurations may be altered due to work plan revisions. The following shall be used as guidance in determining zone designations.

8.3.3.1 Support Zone

The SZ will be the field support area for most operations and will be located at the perimeter of the CRZ. The SZ provides for field team communications and emergency response. Appropriate support and safety equipment will be located in this zone. Potentially contaminated personnel and materials will not be allowed in this zone. The only exception will be appropriately packaged, decontaminated and labeled samples.

8.3.3.2 Contamination Reduction Zone

The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for 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 access and egress, access for heavy equipment, and for emergency support services.

8.3.3.3 Exclusion Zone

All activities that may involve exposure to Site contaminants, hazardous materials or conditions, should be considered an EZ. This zone will be clearly delineated by cones, tape or other means. The SSC/SSM 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 SSC/SSM and shall allow adequate space for the activity to be completed, for field members and for emergency equipment.

8.4 Decontamination Procedures

Equipment decontamination will take place in designated areas only. The Remediation Contractor will construct a decontamination pad of heavy (10-mil) polyethylene plastic sheeting bolstered on the perimeter with wood, hay bales, or other materials so as to contain all decontamination water. The pad will be large enough to accommodate the equipment to be decontaminated and cleaning personnel and will adequately collect all decontamination fluids. It shall have a sump to collect water inside the pad.

8.4.1 Decontamination of Equipment

Decontamination equipment may include the following, as appropriate:

- Wash tubs (1 wash, 1 rinse)
- Several scrub brushes
- Disposable towels
- Seating to facilitate boot removal
- Decontamination solution (e.g., non-phosphate detergent)
- Duct tape
- Hand soap
- Skin wash water source
- Special rinse solutions for hand sampling tools
- Steam cleaner

8.4.2 Personal Decontamination Procedures

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.	Remove outer gloves and deposit in waste container.
3.	If clothing has become contaminated, remove it and place it into a poly bag.
4.	Remove inner gloves and deposit in container with liner.
5.	Wash hands and face.
6.	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 Station 2.
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.

PERSONAL DECONTAMINATION PROCEDURES FOR LEVEL C PROTECTION	
12.	If inner clothing has become contaminated, remove it and place it into a poly bag.
13.	Wash hands and face if shower is not available.
14.	Put on clean clothes.

Attachment 1
Key Personnel and Emergency Phone Numbers

Key Personnel and Emergency Numbers

Nassau County Police Department, 4th Precinct	516-573-6400
Island Park Fire Department	516-431-1213
Long Beach Medical Center 455 East Bay Drive Long Beach, New York 11561	516-897-1000
Emergency Medical Service (ambulance)	911
Posillico Project Manager (Primary) John Soliman	631-390-5751 cell: 516-807-1847
Posillico Task Manager (Secondary) Jim Boulukos	631-390-5743 cell: 516-790-4270
Posillico Site Health and Safety Officer Angelo Occhiogrosso	516-315-1053
Posillico Corporate Safety Director Paul McKinney	631-390-5728 cell: 516-807-8077
National Response Center	(800) 424-8802
NYSDEC Spill Hotline	(800) 457-7362

Attachment 2
Safety Inspection Form

Posillico Safety Inspection Form

Date of Inspection _____ Inspector(s) _____

Description of Job _____

Building No. _____ Location within building _____

Area Location/Description (if outdoors) _____

ITEM	Y	N	N/A	Comments / Remarks
I. Personal Protective Equipment				
Hard hats are being worn when overhead, falling or flying hazards exist;				
Safety glasses or face shields are used for welding, cutting, nailing (including pneumatic), or when working with concrete and/or harmful chemicals;				
Proper shoes or boots are worn to lessen slipping hazards and prevent toe crushing and nail punctures; and				
Safety belts and/or harness systems are in use for fall protection				
II. Housekeeping & Access Around Site				
Walkways and stairways are kept clear of trash/debris and other materials such as tools and supplies to prevent tripping.				
Boxes, scrap lumber and other materials are picked up and put in a dumpster or trash/debris area to prevent fire and tripping hazards				
Enough light is provided to allow workers to see and to prevent accidents				
III. Stairs & Ladders				
Permanent or temporary guardrails are installed on stairs, before stairs are used for general access, between levels to prevent someone from falling or stepping off edges.				
Manufactured and job-made ladders are kept in good condition and free of defects.				
Ladders are inspected before use for broken rungs or other defects so falls do not happen. Defective ladders are discarded or repaired				

Posillico Safety Inspection Form

ITEM	Y	N	N/A	Comments / Remarks
III. Stairs & Ladders				
Ladders are secured near the top or at the bottom to prevent them from slipping and causing falls				
Ladders are secured on a stable and level surface, when they cannot be tied off, so they cannot be knocked over or their bottoms kicked out.				
Ladders are extended at least 3 feet above the landing to provide a handhold or for balance when getting on and off the ladder from other surfaces				
Ladders are only used for what they were made and not as a platform, runway, or as scaffold planks				
IV. Scaffolds & Other Work Platforms				
Ladders or stairs are provided to get on and off scaffolds and work platforms safely.				
Scaffolds and work platforms are kept free of debris. Tools and materials are kept as neat as possible on scaffolds and platforms. This will help prevent materials from falling and workers from tripping.				
Scaffolds are erected on firm and level foundations.				
First consider the use of finished floors to support the load and provide a stable base.				
Place scaffold legs on firm footing and secured from movement or tipping, especially surfaces on dirt or similar surfaces				
Erect and dismantle scaffolds under the supervision of a competent person.				
The competent person must inspect scaffolds before each use.				
Do not use blocks, bricks, or pieces of lumber to level or stabilize the footings. Manufactured base plates or "mud sills" made of hardwood or equivalent can be used.				
V. Planking				
Fully plank or use manufactured decking to provide a full work platform on scaffolds. The platform decking and/or scaffold planks must be scaffold grade and not have any visible defects.				

Posillico Safety Inspection Form

ITEM	Y	N	N/A	Comments / Remarks
V. Planking				
Extend planks or decking material at least 6" over the edge or cleat them to prevent movement. The work platform or planks must not extend more than 12" beyond the end supports to prevent tipping when stepping or working.				
Be sure that manufactured scaffold planks are the proper size and that the end hooks are attached to the scaffold frame.				
VI. Scaffold Guardrails				
Guard scaffold platforms that are more than 10 feet above the ground or floor surface with a standard guardrail. If guardrails are not practical, use other fall protection devices such as safety belts/harnesses and lanyards.				
Place the toprail approximately 42" above the work platform or planking with a midrail about half that high at 21".				
Install toe boards when other workers are below the scaffold.				
VII. Fall Protection - Floor and Wall Openings				
Install guardrails around open floors and walls when the fall distance is 6 feet or more. Be sure the toprails can withstand a 200 lb load.				
Construct guardrails with a toprail approximately 42" high with a midrail about half that high at 21".				
Install toeboards when other workers are below the work area.				
Cover floor openings larger than 2x2 (inches) with material to safely support the working load.				
Use other fall protection systems like slide guards, roof anchors or alternative safe work practices when a guardrail system cannot be used.				
Wear proper shoes or footwear to lessen slipping hazards.				
Train workers on safe work practices before performing work on foundation walls, roofs, trusses, or where performing exterior wall erections and floor installations.				

Posillico Safety Inspection Form

ITEM	Y	N	N/A	Comments / Remarks
VIII. Work on Roofs				
Inspect for and remove frost and other slipping hazards before getting onto roof surfaces.				
Wear Cover and secure all skylights and openings, or install guardrails to keep workers from falling through the openings.				
Install slide guards along the roof eave after the first 3 rows of roofing material are installed when the roof pitch is over 4:12 and up to 6:12.				
Use a safety harness system with a solid anchor point on steep roofs with pitch greater than 8:12 or if the ground to eave height exceeds 25 feet.				
Stop roofing operations when storms, high winds or other adverse weather conditions create unsafe conditions.				
IX. Excavations & Trenching - General				
Find the location of all underground utilities by contacting the local utility locating service before digging.				
Keep workers away from digging equipment and never allow workers in an excavation when equipment is in use.				
Keep workers from getting between equipment in use and other obstacles and machinery that can cause crushing hazards				
Keep equipment and the excavated dirt (spoils pile) back 2 feet from the edge of the excavation.				
Have a competent person conduct daily inspections and correct any hazards before workers enter a trench or excavation.				
Provide workers a way to get into and out of a trench or excavation. Ladders and ramps can be used and must be within 25 feet of the worker.				
For excavations and utility trenches over 5 feet deep, use shoring, shields (trench boxes), benching, or slope back the sides. Unless soil analysis has been completed, the earth's slope must be at least 1 1/2 horizontal to 1 vertical.				
Keep water out of trenches with a pump or drainage system, and inspect the area for soil movement and potential cave-ins.				

ITEM	Y	N	N/A	Comments / Remarks
IX. Excavations & Trenching - General				
Keep drivers in the cab and workers away when dirt and other debris are being loaded into dump trucks. Workers must never be allowed under any load and must stay clear of the back of vehicles.				
X. Foundations After the foundation walls are constructed, special precautions must be taken to prevent injury from cave-ins in the area between the excavation wall and the foundation wall				
The depth of the foundation/basement trench cannot exceed 7 1/2 feet deep unless other cave-in protection is provided.				
Keep the horizontal width of the foundation trench at least 2 feet wide. Make sure there is no earth vibration while workers are in the trench.				
Plan the foundation trench work to minimize the number of workers in the trench and the length of time they spend there.				
XI. Tools & Equipment				
Maintain all hand tools and equipment in safe condition and check regularly for defects. Broken or damaged tools and equipment must be removed from the jobsite.				
Use double insulated tools, or ensure the tools are grounded.				
Plan the foundation trench work to minimize the number of workers in the trench and the length of time they spend there.				
Use double insulated tools, or ensure the tools are grounded.				
Equip all power saws (circular, skill, table, etc.) with blade guards. Saws must be turned off when unattended.				
Provide training for workers before pneumatic or powder-actuated tools are used.				
Pneumatic and powder-actuated tools must only be used by trained and experienced personnel. Require proper eye protection for workers.				
Never leave cartridges for pneumatic or powder-actuated tools unattended. Keep equipment in a safe place, according to the manufacturers' instructions.				

Posillico Safety Inspection Form

ITEM	Y	N	N/A	Comments / Remarks
XII. Vehicles & Mobile Equipment				
Inform workers verbally and provide training to stay clear of backing and turning vehicles and equipment with rotating cabs.				
Maintain back-up alarms for equipment with limited rear view or use someone to help guide them back.				
Verify experience or provide training to crane and heavy equipment operators.				
Maintain at least a 10-foot clearance from overhead power lines when operating equipment.				
Block up the raised bed when inspecting or repairing dump trucks.				
Use a tag line to control materials moved by a crane.				
Provide flagmen with orange and red warning garments while working in vehicular traffic.				
XIII. Electrical				
Prohibit work on new and existing energized (hot) electrical circuits until all power is shut off and a positive "Lockout/Tagout System" is in place.				
Maintain all electrical tools and equipment in safe condition and check regularly for defects.				
Broken or damaged tools and equipment must be removed from the jobsite.				
Protect all temporary power (including extension cords) with Ground Fault Circuit Interrupters (GFCIs). Plug into a GFCI protected temporary power pole, a GFCI protected generator, or use a GFCI extension cord to protect against shocks.				
Locate and identify overhead electrical power lines. Make sure that ladders, scaffolds, equipment or materials never come within 10 feet of electrical power lines.				
XIV. Fire Prevention				
Provide fire extinguishers near all welding, soldering, or other sources of ignition.				

ITEM	Y	N	N/A	Comments / Remarks
XIV. Fire Prevention				
Avoid spraying of paint, solvents or other types of flammable materials in rooms with poor ventilation. Buildup of fumes and vapors can cause explosions or fires.				
Store gasoline and other flammable materials in a safety can outdoors or in an approved storage facility.				
Provide one fire extinguisher within 100 feet of employees for each 3,000 square feet of building.				
XV. Asbestos				
Conduct air monitoring where there may be asbestos exposure				
Where employees may be exposed to asbestos, establish a program which includes: a. Awareness training b. Health effects of asbestos exposure c. Caution labels and signs d. Use of appropriate respiratory protection e. Protective clothing f. Change areas for storage of work and street clothes g. Medical surveillance h. Recordkeeping i. Personnel certifications j. Contractor licensing				
Establish regulated areas if the permissible exposure limit (PEL) is likely to be exceeded				
Employ the following engineering controls to minimize asbestos fiber release: a. Local ventilation exhaust b. HEPA filtration and vacuuming c. Work area isolation d. Wet handling methods				

Posillico Safety Inspection Form

ITEM	Y	N	N/A	Comments / Remarks
XV. Asbestos				
Ensure all activities are being conducted in accordance with USEPA, USOSHA, USDOT, NYSDOL, NYCDEP, and NYCDOS rules and regulations.				
Ensure all power tools are equipped with HEPA filtered local exhaust ventilation.				
Ensure all asbestos waste is properly labeled and disposed of.				
XVI. Dusts, Gases, Fumes, and Mists				
Ensure material safety data sheets (MSDS) are maintained on each product in use at the construction site.				
Provide adequate ventilation				
Ensure proper protective equipment is used to protect against overexposure				
XVII. Silica				
Provide adequate exhaust to remove silica particles from the work area				
Provide respirators for employees who may be overexposed to silica dust particles				
XVIII. Noise				
Provide hearing protectors when noise levels exceed 90 decibels on the A weighted scale (dbA)				
Enforce the use of hearing protective equipment				
Establish administrative controls to reduce or eliminate excessive noise				
XIX. Respiratory Protection				
Have a written respiratory protection program in effect in accordance with 29 CFR 1910.134				
Selection of respirators should be based on the amount and type of toxin present, and should be comfortable to the user				

ITEM	Y	N	N/A	Comments / Remarks
XIX. Respiratory Protection				
The issuance of respiratory equipment should include the following: a. Instruction in the proper use of respiratory equipment b. Allowing the user to become familiar with the equipment prior to use c. Qualitative or quantitative fit testing d. Positive and negative pressure field testing prior to each use e. Maintenance of fit test records				
Ensure workers are properly trained in the use of respiratory protective equipment, and are familiar with the written respiratory protection program				
Ensure workers are familiar with the following: a. Cleaning of the respirator b. Storage of the respirator c. Inspecting of the respirator d. Procedures for ordering and installing replacement parts				
Ensure all workers who wear respirators have been medically cleared to wear such equipment				
Procedures are in place to monitor the work area environment to ensure proper respiratory equipment has been selected				
XX. Hazardous Materials				
Store flammable and combustible liquids in approved containers, and in approved fire cabinets when not in use				
Keep flammable and combustible liquids (except for storage in approved fire cabinets) at least 25 feet from any ignition source (smoking materials, open flames, electrical power, grinders, etc.)				
Use bonding straps on bare metal of containers when transferring flammable or combustible liquids between containers				
Use grounding straps on flammable or combustible liquid metal drums (when transferring liquid)				
Paint spray equipment that is bonded and grounded				

Posillico Safety Inspection Form

ITEM	Y	N	N/A	Comments / Remarks
XX. Hazardous Materials				
Store caustics, acids, flammables and combustibles, and oxidizers separately Compressed gas cylinders should be strapped in storage and transport, segregated by full or empty, and secured against falls				
Compressed gas cylinders should be tagged "empty" or "MT" when spent				
Hazardous material and chemical containers should be properly labeled (including squeeze bottles)				
Prohibit eating, smoking, drinking and applying cosmetics in hazardous materials storage and use areas				
Ensure a spill control and response program is in effect				
Store waste chemicals (including waste paint, solvents, etc), contaminated rags, debris (including paint cans, stir sticks, paper, plastic, etc) in accumulated storage as designated by the SSHO and as follows: a. Segregated containers labeled "Hazardous Waste" with a description of the waste b. Keep lids closed on containers c. Date full containers and arrange for removal from the site				
If waste water is being generated, ensure the following: a. Label containers as described above b. Store tanks in secondary contained areas as approved by the SSHO c. Date full containers and arrange for removal from the site d. Do not overfill tanks or mishandle the waste water				
Obtain MSDS for all new materials brought onto the site				
XXI. Confined Spaces				
Provide training for employees in confined space entry				
Provide proper and appropriate equipment				

Posillico Safety Inspection Form

ITEM	Y	N	N/A	Comments / Remarks
XXI. Confined Spaces				
In manholes, ensure that vehicular exhaust or carbon monoxide cannot permeate into the space				
Examine the space for decaying vegetation or animal matter which may produce methane				
Survey the space for possible industrial waste which may contribute to the accumulation of a toxic or combustible atmosphere				
If there is inadequate natural air movement and forced ventilation is not provided, test the atmosphere for combustible gases and air contaminants				
Ensure the space is ventilated to safe levels of toxic or combustible gases before employees enter				
If ventilation is not sufficient to remove the hazardous atmosphere, ensure the employees entering the space wear the proper and approved respiratory protective equipment prior to entering the space				
Ensure that employees are trained in the use of respirators				
Ensure that the confined space entry program is in effect, and that entry permits have been filled out				
Ensure constant communication with employees in the immediate vicinity who are not within the confined space				
Ensure that the internal atmosphere is tested for toxic and combustible gases				
XXII. Work Over or Near Water				
Ensure ring buoys with at least 90 feet of line are present every 200 feet along the bulkhead.				
Ensure that the water's edge warning indicator visible and present in all areas not subject to active work.				
Ensure that U.S. Coast Guard-approved life jacket or buoyant work vests available and utilized by workers when working over or near the water.				

Attachment 3
Site Hazard Assessment

ATTACHMENT 3

SITE HAZARD ASSESSMENT

1.0 POTENTIAL HAZARDS OF THE SITE

This section presents all assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under the HASP. A detail on types of chemicals the Remediation Contractor anticipates to encounter at different locations during the remedial activities is listed per location in the Remedial Action Work Plan provided under a separate cover.

1.1 Properties of Chemical Contamination

Based on the results of the Final Remedial Investigation Report dated 2008 and the Supplemental Investigation Report dated 2011, the major contaminants of concern for the site soils are petroleum contamination and containing concentrations of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and metals above the proposed Site Specific Soil Cleanup Objectives (SSSCOs). Dissolved levels of petroleum constituents (e.g., benzene) and a petroleum product in the form of light non-aqueous phase liquid (LNAPL) represent the major contaminants of concern for the groundwater.

Volatile organic compounds (e.g., benzene) are a potential exposure concern during intrusive activities and acute exposure may cause short-term respiratory distress and irritation, lightheadedness, nausea, and headaches.

SVOCs are present at the Site in the form of weathered petroleum, naphthalene, and phenol. 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. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation.

Arsenic and lead are naturally occurring toxic materials. Lead exposure can cause kidney disease, hypotension, anemia, and loss of weight. Relatively high doses of arsenic have been reported to cause bone marrow suppression in humans. The principal exposure pathway for each is probably inhalation of these metals adsorbed to particulates, but ingestion and possibly dermal exposure may also be common.

Combustible gas, if detected above the lower explosive limits is hazardous due to the potential to cause fires and explosions. Hydrogen sulfide may be a component of the combustible gas detected at the Site. Exposure to high levels of hydrogen sulfide can result in eye irritation, a sore throat, cough, shortness of breath and fluid in the lungs. These symptoms usually go away after the exposure stops. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness.

1.2 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals and insects.

1.2.1 Animals

During site operations, animals such as dogs, cats, pigeons, mice and rats may be encountered. Workers shall use discretion and avoid all contact with animals. Bites and scratches from dogs and cats can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting Hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis; cryptococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

1.2.2 Insects

Insects, including ticks, bees, wasps, hornets, mosquitoes, and spiders, may be present at the Site, particularly in areas that are warm, sheltered, have standing water or are not frequented by people. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition, in addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis and ticks may cause Lyme Disease and other tick-borne infections.

1.3 Physical Hazards

Most safety hazards are discussed in the hazard prevention and monitoring guidelines in Appendices C through F.

1.3.1 Temperature Extremes

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.

Workers may be exposed to the hazard of working in a cold environment. 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.

1.3.2 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Ear protection is required and should be used in designated areas of the Stations as indicated by the posted signs. Workers with 8-hour TWA exposures exceeding 90 dBA will be included in a Noise Control Plan.

1.3.3 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. Ground Fault Circuit Interrupters (GFCIs) are required for all portable tools.

1.3.4 Slips, Trips, and Falls

Working in and around the Site will pose slip, trip and fall hazards due to equipment, piping, slippery surfaces that may be oil covered, or from surfaces that are wet from rain or ice. Potential adverse health effects include falling to the ground and becoming injured or twisting an ankle. In addition, within the Waterside basement, several areas have low clearance and overhead piping, constituting an overhead hazard, where you could strike your head.

1.3.5 Fire and Explosion

All excavation/boring work shall be preceded by drawing review. No utilities are expected to be active in the remedial area because the demolition is complete. The possibility of encountering fire and explosion hazards exists from underground gases. Therefore, all excavation/boring equipment operated on the Site must be grounded.

1.3.6 Manual Lifting

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique can result in back injuries and strains. 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.

1.3.7 Drill Rig Operations

In order to install and collect soil borings and to install monitoring wells, a hollow stem auger or air rotary drill rig will be used.

1.3.8 Vehicular Traffic

When performing sampling operations outside the facility, there is potential for encountering vehicular traffic hazards on Washington Avenue and other neighboring streets. Personnel and equipment could be struck by passing traffic resulting in damaged equipment and/or serious physical harm.

1.3.9 Working Over or Near Water

Remediation Contractor personnel working over or near water, where the danger of drowning exists, shall wear U.S. Coast Guard-approved life jacket or buoyant work vests.

Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations along the bulkhead. The distance between ring buoys shall not exceed 200 feet.

2.0 NATURE AND EXTENT OF CONTAMINATION

A Remedial Investigation was performed in the Site during 2008 and supplemental investigations occurred in 2011. Presented in this Section is a summary of the results compared to site-specific criteria. The applicants are proposing the use of a combination of established soil cleanup objectives, as follows:

Contaminant	Proposed SSSCO
Targeted Volatile Organic Compounds	Track 2 Restricted Residential, Protection of Public Health
Targeted Semivolatile Organic Compounds	Track 2 Restricted Residential, Protection of Public Health
10 Volatile Organic Tentatively Identified Compounds	10 ppm (total)
20 Semivolatile Organic Tentatively Identified Compounds	100 ppm (total)
Source Material	Removal of Gross Contamination and Free Product (As defined in 6 NYCRR 375-1.2(u)) and 6 NYCRR 375-1.2(ac)

Attachment 4
Certificates of Training

Attachment 5
Employee Medical Data Sheet

Attachment 5

EMPLOYEE MEDICAL DATA SHEET

In case of injury, this form is to accompany personnel to the hospital. It is designed to provide needed medical information in times of emergency.

This form is to be kept on-site under the care of the SSC or his designee.

Employee Name:_____
Address:_____
Home Telephone:_____
Occupation:_____
Age:_____Height:_____ Weight:_____ Blood Type:_____

Name and Number of Emergency Contact:

1.) _____
2.) _____

Allergies and Sensitivities(*please list allergies to drugs or other materials*):

_____

_____

Medications (*please list any medications, prescription or non-prescription that you are presently using or expect to use*):

_____

_____

Medical Restrictions (*please list any current or past medical restrictions or significant illnesses experienced in the past):*

_____

_____

Your Doctor's name, address and phone number:

_____

_____

Attachment 6
Medical Evaluation Form

ATTACHMENT 6
MEDICAL EVALUATION FORM

Employee Name: _____ Employee Number: _____

Office: _____ Date of Exam: _____

_____ Initial _____ Annual _____ Exit Protocol

I have reviewed the results of the medical health history, physical examination, and laboratory tests prescribed by _____: and certify that: the record is complete, and the following were not performed:

_____

_____

_____

Based upon my examination, I certify that this employee:

_____ Have no medical contraindications to the use of supplied air or self-contained breathing apparatus (SCBA) and air-purifying respirators.

_____ Has a medical restriction in the use of respiratory equipment (describe below):

_____

_____

_____

Based upon by examination, I certify that this employee:

_____ Have no medical contraindications to full participation in hazardous waste site work, when conducted under the conditions of adequate training and a health and safety plan.

_____ Have medical limitations that restrict full participation in hazardous waste site work. Describe work functions limitations (i.e., lifting, temporary limitation, pending medical follow-up work, etc.).

Comments
: _____

_____

_____

ATTACHMENT 6

MEDICAL EVALUATION FORM (Continued)

_____ Is medically restricted from any direct work with hazardous waste or hazardous waste sites, but **may** continue to perform office work.

Comments
:

I have communicated the examination results to the employees and have informed the employee about medical conditions discovered during my examination that require further examination or treatment.

Name of Physician

Signature of Examining Physician

Address:

Date:

Attachment 7
Medical First Aid Treatment Record (G1)
OSHA 101 Form (G2)
OSHA 300 Log (G3)

Medical First Aid Accident Treatment Report

Complete this form for all accidents involving only first aid treatment, and which are non-reportable as defined by OSHA 29 CFR 1910.4.

Name of employee receiving treatment: _____ Date of treatment _____

Occupation of employee receiving treatment _____ Employer _____

Employee's home telephone number _____

Name of First Aid Provider _____

Time of accident _____ Date of accident _____

Location of accident _____

Describe how the accident occurred (be specific; indicate the cause such as: debris, oil spill, ladder in poor condition or not tied-off)

_____

_____

_____

Describe the injury:

_____

_____

_____

Indicate First Aid measures taken:

_____

_____

What can be done to prevent future accidents of this kind?:

_____

_____

OSHA
Forms for Recording
Work-Related Injuries and Illnesses

U.S. Department of Labor
Occupational Safety and Health Administration

What's Inside...

In this package, you'll find everything you need to complete OSHA's *Log* and the *Summary of Work-Related Injuries and Illnesses* for the next several years. On the following pages, you'll find:

- ***An Overview: Recording Work-Related Injuries and Illnesses*** — General instructions for filling out the forms in this package and definitions of terms you should use when you classify your cases as injuries or illnesses.

- ***How to Fill Out the Log*** — An example to guide you in filling out the *Log* properly.

- ***Log of Work-Related Injuries and Illnesses*** — Several pages of the *Log* (but you may make as many copies of the *Log* as you need.) Notice that the *Log* is separate from the *Summary*.

- ***Summary of Work-Related Injuries and Illnesses*** — Removable *Summary* pages for easy posting at the end of the year. Note that you post the *Summary* only, not the *Log*.

- ***Worksheet to Help You Fill Out the Summary*** — A worksheet for figuring the average number of employees who worked for your establishment and the total number of hours worked.

- ***OSHA's 301: Injury and Illness Incident Report*** — Several copies of the OSHA 301 to provide details about the incident. You may make as many copies as you need or use an equivalent form.

Take a few minutes to review this package. If you have any questions, ***visit us online at www.osha.gov*** or ***call your local OSHA office.*** We'll be happy to help you.

An Overview: Recording Work-Related Injuries and Illnesses

The Occupational Safety and Health (OSH) Act of 1970 requires certain employers to prepare and maintain records of work-related injuries and illnesses. Use these definitions when you classify cases on the Log. OSHA's recordkeeping regulation (see 29 CFR Part 1904) provides more information about the definitions below.

The *Log of Work-Related Injuries and Illnesses* (Form 300) is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened. The *Summary* — a separate form (Form 300A) — shows the totals for the year in each category. At the end of the year, post the *Summary* in a visible location so that your employees are aware of the injuries and illnesses occurring in their workplace.

Employers must keep a *Log* for each establishment or site. If you have more than one establishment, you must keep a separate *Log* and *Summary* for each physical location that is expected to be in operation for one year or longer.

Note that your employees have the right to review your injury and illness records. For more information, see 29 Code of Federal Regulations Part 1904.35, *Employee Involvement.*

Cases listed on the *Log of Work-Related Injuries and Illnesses* are not necessarily eligible for workers' compensation or other insurance benefits. Listing a case on the *Log* does not mean that the employer or worker was at fault or that an OSHA standard was violated.

When is an injury or illness considered work-related?

An injury or illness is considered work-related if an event or exposure in the work environment caused or contributed to the condition or significantly aggravated a preexisting condition. Work-relatedness is presumed for injuries and illnesses resulting from events or exposures occurring in the workplace, unless an exception specifically applies. See 29 CFR Part 1904.5(b)(2) for the exceptions. The work environment includes the establishment and other locations where one or more employees are working or are present as a condition of their employment. See 29 CFR Part 1904.5(b)(1).

Which work-related injuries and illnesses should you record?

Record those work-related injuries and illnesses that result in:

- death,
- loss of consciousness,
- days away from work,
- restricted work activity or job transfer, or
- medical treatment beyond first aid.

You must also record work-related injuries and illnesses that are significant (as defined below) or meet any of the additional criteria listed below.

You must record any significant work-related injury or illness that is diagnosed by a physician or other licensed health care professional. You must record any work-related case involving cancer, chronic irreversible disease, a fractured or cracked bone, or a punctured eardrum. See 29 CFR 1904.7.

What are the additional criteria?

You must record the following conditions when they are work-related:

- any needlestick injury or cut from a sharp object that is contaminated with another person's blood or other potentially infectious material;
- any case requiring an employee to be medically removed under the requirements of an OSHA health standard;
- tuberculosis infection as evidenced by a positive skin test or diagnosis by a physician or other licensed health care professional after exposure to a known case of active tuberculosis.

What is medical treatment?

Medical treatment includes managing and caring for a patient for the purpose of combating disease or disorder. The following are not considered medical treatments and are NOT recordable:

- visits to a doctor or health care professional solely for observation or counseling;
- diagnostic procedures, including administering prescription medications that are used solely for diagnostic purposes; and
- any procedure that can be labeled first aid. *(See below for more information about first aid.)*

What do you need to do?

1. Within 7 calendar days after you receive information about a case, decide if the case is recordable under the OSHA recordkeeping requirements.
2. Determine whether the incident is a new case or a recurrence of an existing one.
3. Establish whether the case was work-related.
4. If the case is recordable, decide which form you will fill out as the injury and illness incident report.

   You may use *OSHA's 301: Injury and Illness Incident Report* or an equivalent form. Some state workers compensation, insurance, or other reports may be acceptable substitutes, as long as they provide the same information as the OSHA 301.

How to work with the Log

1. Identify the employee involved unless it is a privacy concern case as described below.
2. Identify when and where the case occurred.
3. Describe the case, as specifically as you can.
4. Classify the seriousness of the case by recording the **most serious outcome** associated with the case, with column J (Other recordable cases) being the least serious and column G (Death) being the most serious.
5. Identify whether the case is an injury or illness. If the case is an injury, check the injury category. If the case is an illness, check the appropriate illness category.

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What is first aid?

If the incident required only the following types of treatment, consider it first aid. Do NOT record the case if it involves only:

- using non-prescription medications at non-prescription strength;
- administering tetanus immunizations;
- cleaning, flushing, or soaking wounds on the skin surface;
- using wound coverings, such as bandages, BandAids™, gauze pads, etc., or using SteriStrips™ or butterfly bandages.
- using hot or cold therapy;
- using any totally non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.;
- using temporary immobilization devices while transporting an accident victim (splints, slings, neck collars, or back boards).
- drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters;
- using eye patches;
- using simple irrigation or a cotton swab to remove foreign bodies not embedded in or adhered to the eye;
- using irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign material from areas other than the eye;
- using finger guards;
- using massages;
- drinking fluids to relieve heat stress

How do you decide if the case involved restricted work?

Restricted work activity occurs when, as the result of a work-related injury or illness, an employer or health care professional keeps, or recommends keeping, an employee from doing the routine functions of his or her job or from working the full workday that the employee would have been scheduled to work before the injury or illness occurred.

How do you count the number of days of restricted work activity or the number of days away from work?

Count the number of calendar days the employee was on restricted work activity or was away from work as a result of the recordable injury or illness. Do not count the day on which the injury or illness occurred in this number. Begin counting days from the day after the incident occurs. If a single injury or illness involved both days away from work and days of restricted work activity, enter the total number of days for each. You may stop counting days of restricted work activity or days away from work once the total of either or the combination of both reaches 180 days.

Under what circumstances should you NOT enter the employee's name on the OSHA Form 300?

You must consider the following types of injuries or illnesses to be privacy concern cases:

- an injury or illness to an intimate body part or to the reproductive system,
- an injury or illness resulting from a sexual assault,
- a mental illness,
- a case of HIV infection, hepatitis, or tuberculosis,
- a needlestick injury or cut from a sharp object that is contaminated with blood or other potentially infectious material (see 29 CFR Part 1904.8 for definition), and
- other illnesses, if the employee independently and voluntarily requests that his or her name not be entered on the log.

You must not enter the employee's name on the OSHA 300 *Log* for these cases. Instead, enter "privacy case" in the space normally used for the employee's name. You must keep a separate, confidential list of the case numbers and employee names for the establishment's privacy concern cases so that you can update the cases and provide information to the government if asked to do so.

If you have a reasonable basis to believe that information describing the privacy concern case may be personally identifiable even though the employee's name has been omitted, you may use discretion in describing the injury or illness on both the OSHA 300 and 301 forms. You must enter enough information to identify the cause of the incident and the general severity of the injury or illness, but you do not need to include details of an intimate or private nature.

What if the outcome changes after you record the case?

If the outcome or extent of an injury or illness changes after you have recorded the case, simply draw a line through the original entry or, if you wish, delete or white-out the original entry. Then write the new entry where it belongs. Remember, you need to record the most serious outcome for each case.

Classifying injuries

An injury is any wound or damage to the body resulting from an event in the work environment.

Examples: Cut, puncture, laceration, abrasion, fracture, bruise, contusion, chipped tooth, amputation, insect bite, electrocution, or a thermal, chemical, electrical, or radiation burn. Sprain and strain injuries to muscles, joints, and connective tissues are classified as injuries when they result from a slip, trip, fall or other similar accidents.

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Classifying illnesses

Skin diseases or disorders

Skin diseases or disorders are illnesses involving the worker's skin that are caused by work exposure to chemicals, plants, or other substances.

Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; friction blisters, chrome ulcers; inflammation of the skin.

Respiratory conditions

Respiratory conditions are illnesses associated with breathing hazardous biological agents, chemicals, dust, gases, vapors, or fumes at work.

Examples: Silicosis, asbestosis, pneumonitis, pharyngitis, rhinitis or acute congestion; farmer's lung, beryllium disease, tuberculosis, occupational asthma, reactive airways dysfunction syndrome (RADS), chronic obstructive pulmonary disease (COPD), hypersensitivity pneumonitis, toxic inhalation injury, such as metal fume fever, chronic obstructive bronchitis, and other pneumoconioses.

Poisoning

Poisoning includes disorders evidenced by abnormal concentrations of toxic substances in blood, other tissues, other bodily fluids, or the breath that are caused by the ingestion or absorption of toxic substances into the body.

Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by carbon monoxide, hydrogen sulfide, or other gases; poisoning by benzene, benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays, such as parathion or lead arsenate; poisoning by other chemicals, such as formaldehyde.

All other illnesses

All other occupational illnesses.

Examples: Heatstroke, sunstroke, heat exhaustion, heat stress and other effects of environmental heat; freezing, frostbite, and other effects of exposure to low temperatures; decompression sickness; effects of ionizing radiation (isotopes, x-rays, radium); effects of nonionizing radiation (welding flash, ultra-violet rays, lasers); anthrax; bloodborne pathogenic diseases, such as AIDS, HIV, hepatitis B or hepatitis C; brucellosis; malignant or benign tumors; histoplasmosis; coccidioidomycosis.

When must you post the Summary?

You must post the *Summary* only — not the *Log* — by February 1 of the year following the year covered by the form and keep it posted until April 30 of that year.

How long must you keep the Log and Summary on file?

You must keep the *Log* and *Summary* for 5 years following the year to which they pertain.

Do you have to send these forms to OSHA at the end of the year?

No. You do not have to send the completed forms to OSHA unless specifically asked to do so.

How can we help you?

If you have a question about how to fill out the *Log*,

- ❑ **visit us online at www.osha.gov** or
- ❑ **call your local OSHA office.**

U.S. Department of Labor
Occupational Safety and Health Administration

Optional

Calculating Injury and Illness Incidence Rates

What is an incidence rate?

An incidence rate is the number of recordable injuries and illnesses occurring among a given number of full-time workers (usually 100 full-time workers) over a given period of time (usually one year). To evaluate your firm's injury and illness experience over time or to compare your firm's experience with that of your industry as a whole, you need to compute your incidence rate. Because a specific number of workers and a specific period of time are involved, these rates can help you identify problems in your workplace and/or progress you may have made in preventing work-related injuries and illnesses.

How do you calculate an incidence rate?

You can compute an occupational injury and illness incidence rate for all recordable cases or for cases that involved days away from work for your firm quickly and easily. The formula requires that you follow instructions in paragraph (a) below for the total recordable cases or those in paragraph (b) for cases that involved days away from work, *and* for both rates the instructions in paragraph (c).

(a) *To find out the total number of recordable injuries and illnesses that occurred during the year,* count the number of line entries on your OSHA Form 300, or refer to the OSHA Form 300A and sum the entries for columns (G), (H), (I), and (J).

(b) *To find out the number of injuries and illnesses that involved days away from work,* count the number of line entries on your OSHA Form 300 that received a check mark in column (H), or refer to the entry for column (H) on the OSHA Form 300A.

(c) *The number of hours all employees actually worked during the year.* Refer to OSHA Form 300A and optional worksheet to calculate this number.

You can compute the incidence rate for all recordable cases of injuries and illnesses using the following formula:

Total number of injuries and illnesses ÷ Number of hours worked by all employees x 200,000 hours = Total recordable case rate

(The 200,000 figure in the formula represents the number of hours 100 employees working 40 hours per week, 50 weeks per year would work, and provides the standard base for calculating incidence rates.)

You can compute the incidence rate for recordable cases involving days away from work, days of restricted work activity or job transfer (DART) using the following formula:

(Number of entries in column H + Number of entries in column I) ÷ Number of hours worked by all employees x 200,000 hours = DART incidence rate

You can use the same formula to calculate incidence rates for other variables such as cases involving restricted work activity (column (I) on Form 300A), cases involving skin disorders (column (M-2) on Form 300A), etc. Just substitute the appropriate total for these cases, from Form 300A, into the formula in place of the total number of injuries and illnesses.

What can I compare my incidence rate to?

The Bureau of Labor Statistics (BLS) conducts a survey of occupational injuries and illnesses each year and publishes incidence rate data by various classifications (e.g., by industry, by employer size, etc.). You can obtain these published data at www.bls.gov or by calling a BLS Regional Office.

Worksheet

Total number of recordable injuries and illnesses in your establishment

[ ]

÷

[ ]

Hours worked by all your employees

X 200,000 =

Total recordable cases incidence rate

[ ]

Total number of recordable injuries and illnesses with a checkmark in column H or column I

[ ]

÷

[ ]

Hours worked by all your employees

X 200,000 =

DART incidence rate

[ ]

How to Fill Out the Log

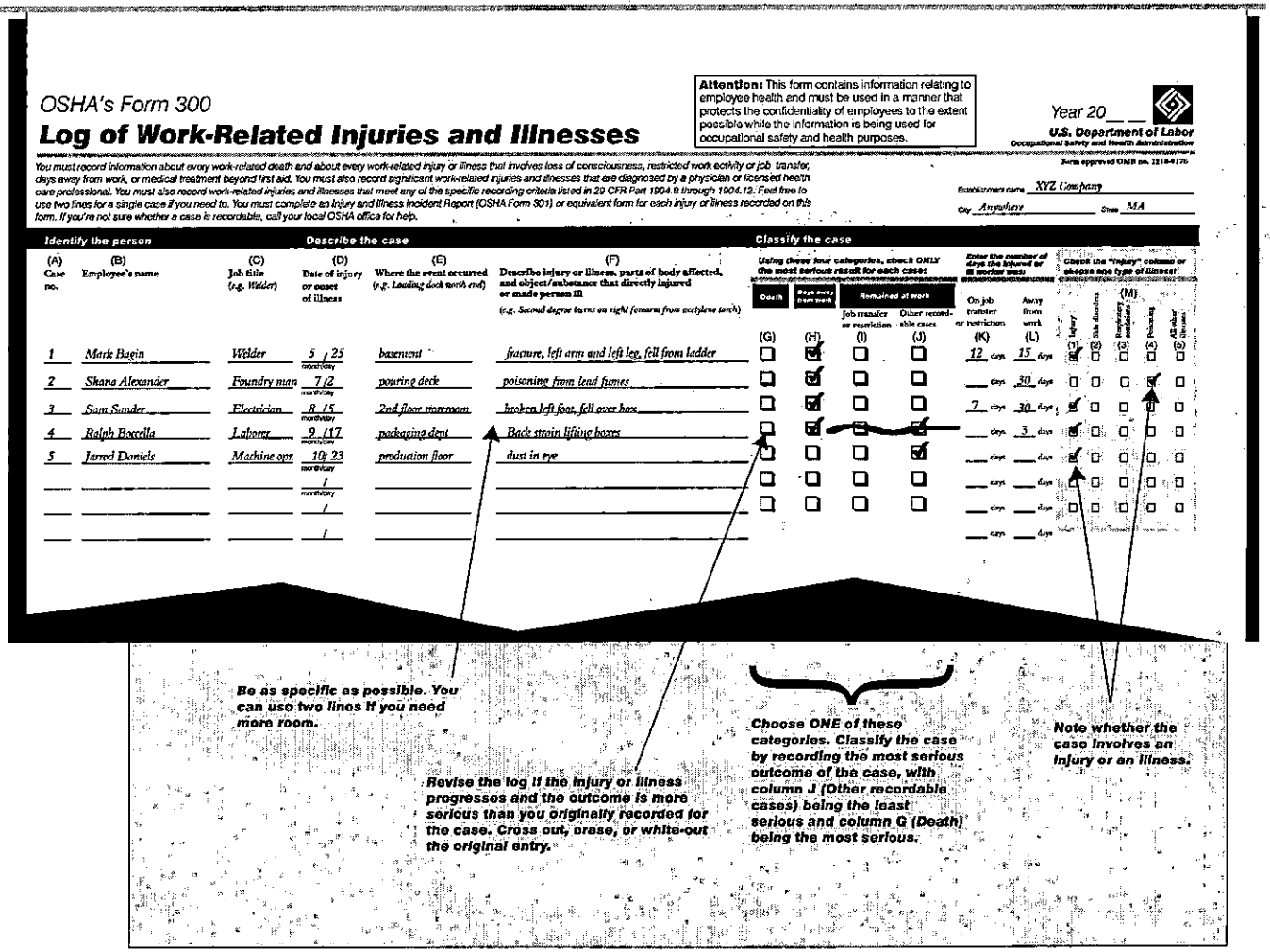
The *Log of Work-Related Injuries and Illnesses* is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened.

If your company has more than one establishment or site, you must keep separate records for each physical location that is expected to remain in operation for one year or longer.

We have given you several copies of the *Log* in this package. If you need more than we provided, you may photocopy and use as many as you need.

The *Summary* — a separate form — shows the work-related injury and illness totals for the year in each category. At the end of the year, count the number of incidents in each category and transfer the totals from the *Log* to the *Summary*. Then post the *Summary* in a visible location so that your employees are aware of injuries and illnesses occurring in their workplace.

You don't post the Log. You post only the Summary at the end of the year.



OSHA's Form 300

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ______________________

City ______________ State ________

Identify the person			Describe the case			Classify the case										
(A) Case no.	(B) Employee's name	(C) Job title (e.g., *Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Using these four categories, check ONLY the most serious result for each case: Death (G)	Days away from work (H)	Remained at work: Job transfer or restriction (I)	Remained at work: Other record-able cases (J)	Enter the number of days the injured or ill worker was: On job transfer or restriction (K)	Away from work (L)	Check the "Injury" column or choose one type of illness: (M) Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	All other illnesses (5)
___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
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___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
___	___	___	__/__ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐
					Page totals ➤	___	___	___	___	___	___	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	All other illnesses (5)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

OSHA's Form 300A

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days of job transfer or restriction	Total number of days away from work
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .

	(M)		
(1) Injuries	_____	(4) Poisonings	_____
		(5) All other illnesses	_____
(2) Skin disorders	_____		
(3) Respiratory conditions	_____		

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., SIC 3715*)

__ __ __ __

Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

( ) - / /
Phone Date

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Optional

Worksheet to Help You Fill Out the Summary

At the end of the year, OSHA requires you to enter the average number of employees and the total hours worked by your employees on the summary. If you don't have these figures, you can use the information on this page to estimate the numbers you will need to enter on the Summary page at the end of the year.

How to figure the average number of employees who worked for your establishment during the year:

❶ ***Add*** the total number of employees your establishment paid in all pay periods during the year. Include all employees: full-time, part-time, temporary, seasonal, salaried, and hourly.

The number of employees paid in all pay periods = ❶ _____

❷ ***Count*** the number of pay periods your establishment had during the year. Be sure to include any pay periods when you had no employees.

The number of pay periods during the year = ❷ _____

❸ ***Divide*** the number of employees by the number of pay periods.

❶ _____ / ❷ _____ = ❸ _____

❹ ***Round the answer*** to the next highest whole number. Write the rounded number in the blank marked *Annual average number of employees.*

The number rounded = ❹ _____

For example, Acme Construction figured its average employment this way:

For pay period...	Acme paid this number of employees...	
1	10	Number of employees paid = 830 ❶
2	0	
3	15	Number of pay periods = 26 ❷
4	30	
5	40	830 / 26 = 31.92 ❸
▼	▼	
24	20	31.92 rounds to 32 ❹
25	15	
26	+10	32 is the annual average number of employees
	830	

How to figure the total hours worked by all employees:

Include hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers subject to day to day supervision by your establishment (e.g., temporary help services workers).

Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, please estimate the hours that the employees actually worked.

If this number isn't available, you can use this optional worksheet to estimate it.

Optional Worksheet

_____ ***Find*** the number of full-time employees in your establishment for the year.

X _____ ***Multiply*** by the number of work hours for a full-time employee in a year.

_____ This is the number of full-time hours worked.

\+ _____ ***Add*** the number of any overtime hours as well as the hours worked by other employees (part-time, temporary, seasonal)

_____ ***Round*** the answer to the next highest whole number. Write the rounded number in the blank marked *Total hours worked by all employees last year.*

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (____)_____-_____ Date ___/___/___

Information about the employee

1) Full name _____

2) Street _____

City _____ State _____ ZIP _____

3) Date of birth ___/___/___

4) Date hired ___/___/___

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional _____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ ZIP _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the *Log* _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ___/___/___

12) Time employee began work _____ AM / PM

13) Time of event _____ AM / PM ☐ Check if time cannot be determined

14) ***What was the employee doing just before the incident occurred?*** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) ***What happened?*** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) ***What was the injury or illness?*** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) ***What object or substance directly harmed the employee?*** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." ***If this question does not apply to the incident, leave it blank.***

18) ***If the employee died, when did death occur?*** Date of death ___/___/___

If You Need Help...

If you need help deciding whether a case is recordable, or if you have questions about the information in this package, feel free to contact us. We'll gladly answer any questions you have.

- **Visit us online at www.osha.gov**
- **Call your OSHA Regional office and ask for the recordkeeping coordinator**

  or

- **Call your State Plan office**

Federal Jurisdiction

Region 1 - 617 / 565-9860
Connecticut; Massachusetts; Maine; New Hampshire; Rhode Island

Region 2 - 212 / 337-2378
New York; New Jersey

Region 3 - 215 / 861-4900
DC; Delaware; Pennsylvania; West Virginia

Region 4 - 404 / 562-2300
Alabama; Florida; Georgia; Mississippi

Region 5 - 312 / 353-2220
Illinois; Ohio; Wisconsin

Region 6 - 214 / 767-4731
Arkansas; Louisiana; Oklahoma; Texas

Region 7 - 816 / 426-5861
Kansas; Missouri; Nebraska

Region 8 - 303 / 844-1600
Colorado; Montana; North Dakota; South Dakota

Region 9 - 415 / 975-4310

Region 10 - 206 / 553-5930
Idaho

State Plan States

Alaska - 907 / 269-4957

Arizona - 602 / 542-5795

California - 415 / 703-5100

*Connecticut - 860 / 566-4380

Hawaii - 808 / 586-9100

Indiana - 317 / 232-2688

Iowa - 515 / 281-3661

Kentucky - 502 / 564-3070

Maryland - 410 / 767-2371

Michigan - 517 / 322-1848

Minnesota - 651 / 284-5050

Nevada - 702 / 486-9020

*New Jersey - 609 / 984-1389

New Mexico - 505 / 827-4230

*New York - 518 / 457-2574

North Carolina - 919 / 807-2875

Oregon - 503 / 378-3272

Puerto Rico - 787 / 754-2172

South Carolina - 803 / 734-9669

Tennessee - 615 / 741-2793

Utah - 801 / 530-6901

Vermont - 802 / 828-2765

Virginia - 804 / 786-6613

Virgin Islands - 340 / 772-1315

Washington - 360 / 902-5554

Wyoming - 307 / 777-7786

*Public Sector only

U.S. Department of Labor
Occupational Safety and Health Administration

U.S. Department of Labor
Occupational Safety and Health Administration

Have questions?

If you need help in filling out the *Log* or *Summary*, or if you have questions about whether a case is recordable, contact us. We'll be happy to help you. You can:

- Visit us online at: **www.osha.gov**
- Call your regional or state plan office. You'll find the phone number listed inside this cover.

First Aid Accident Report

Complete this form for all accidents involving only first aid treatment, and which are non-reportable as defined by OSHA 29 CFR 1910.4.

Name of employee receiving treatment: _____ Date of treatment _____

Occupation of employee receiving treatment _____ Employer _____

Employee's home telephone number _____

Name of First Aid Provider _____

Time of accident _____ Date of accident _____

Location of accident _____

Describe how the accident occurred (be specific; indicate the cause such as: debris, oil spill, ladder in poor condition or not tied-off)

_____

_____

_____

Describe the injury:

_____

_____

_____

Indicate First Aid measures taken:

_____

_____

What can be done to prevent future accidents of this kind?:

_____

_____

Attachment 8
Employee Acknowledgement of SSHSP

ATTACHMENT 8
EMPLOYEE ACKNOWLEDGEMENT OF SITE SPECIFIC HEALTH AND SAFETY PLAN

Remediation Contractor management is committed to the safety of our employees. It is the responsibility of management and supervision to see that every employee is provided with safety instructions for this job, information, the location and opportunity to review the Site Health and Safety Plan. It is also the responsibility of management to provide a safe work environment and observe all safety regulations. No management policy can be effective, however, if each employee does not also have a commitment to the safety policies of the company. To ensure the safety and health of Company employees, the company has developed, and shall implement, the following disciplinary policies.

Any infraction of the Remediation Contractor safety policies and/or Federal, State, or local regulations by a Remediation Contractor employee will result in disciplinary actions.

- A first infraction will result in a verbal warning and the infraction will be documented and become part of the employee's work record. If, during investigation, it is determined that the employee's first infraction causes or could cause serious harm to himself and/or another employee, the result may be other disciplinary actions, including dismissal.

- A second infraction may result in suspension from work. The duration of the suspension will be determined on a case-by-case basis and will be commensurate with the seriousness of the infraction, and may result in dismissal. The infraction will be documented and become part of the employee's work record.

- A third infraction may result in dismissal. This will be documented and become part of the employee's work record, and the employee's name shall be placed on a not-for-rehire list maintained by the company. All information and documentation will be retained by the Company and will not be available to other employers.

Remediation Contractor safety policies and regulations were developed to protect each employee, however, **it is every employee's responsibility to observe and follow the company's safety policies.**

I have been notified of, received, and understand Remediation Contractor safety policies and acknowledge the disciplinary actions that may be taken as a result of non-compliance with such policies.

Date: _____

_____ _____

Employee Name Employee Signature

_____

Remediation Contractor Supervisor

Attachment 9
Confined Space Entry Program

CONFINED SPACE ENTRY

1.0 SCOPE AND APPLICATION

This procedure has been established to set standard requirements for practices and procedures to protect our employees from the hazards of entry into permit required confined spaces, as outlined in OSHA 29 CFR 1910.146.

1.1 Definition

A confined space is defined as an area which:

- Has adequate size and configuration for employee entry;
- Has limited means of access or egress; and
- Is not designed for continuous employee occupancy.

Examples are storage tanks, boilers, sewers, tank cars, and septic tanks.

1.2 Permit Required Confined Space

Is defined as a space that presents, or has potential to present hazards related to atmospheric conditions toxic, flammable asphyxiating, engulfment, configuration or any other recognized serious hazard. The following regulations must be adhered to, once it has been established that the above conditions exist:

- Employees must be informed of confined spaces through the use of signs or other equally effective means, and unauthorized entry must be prevented.
- The Remediation Contractor shall provide specified equipment to all employees involved in confined space entry.
- An attendant must be stationed outside the permitted space during entry.
- Procedures for summoning rescuers and prevention of unauthorized personnel from attempting rescues must be established for different working locations.
- Prepare and sign written permits and order corrective measures for time of entry and will extend only for the duration of the task defined on the entry permit.

1.2.1 Permit System

Entry permits for confined spaces are mandatory. An entry supervisor must authorize entry, prepare and sign written permits and order corrective measures, if needed, and/or cancel permits

when work is completed. Permits must be available to permit space entrants at time of entry and will extend only for the duration of the task. They will be retained for one year to facilitate the confined space program.

1.2.2 Training

Initial and refresher training will be held to provide necessary understanding, skills and knowledge for performing the job safety to affected employees. Training will be conducted whenever an employees duties change, when identifying hazards in the confined space, or when evaluation on the confined space entry program identifies hazards in the confined space, or when an evaluation of the confined space entry program identifies inadequacies in the employees knowledge. Records will be maintained as to certify training of affected employees.

1.2.3 Authorized Entrants

Entrants must know potential hazards; recognize signs or symptoms of exposure and understand the consequences of exposure to hazards. Entrants must also know how to use needed equipment; communication with attendants as required; alert attendants to the warning signs or the existence of possible hazardous conditions; and exit as quickly as possible whenever ordered or alerted, by alarm, warning signs, or prohibited conditions, to do so.

1.2.4 Attendants

Attendants must know potential hazards of confined spaces; be aware of behavioral effects of exposure; maintained continuous identification of authorized attendants; must remain outside the space until relieved, and communicate with entrants as required to monitor activities inside and outside permitted space; order exit if required; summon rescuers if necessary; prevent unauthorized entry and perform non-entry services, if required. They may not perform other duties that interfere with their primary duty to monitor and protect safety of authorized entrants.

1.2.5 Entry Supervisor

Responsible for issuing confined space permits. Must know the hazards of confined spaces and verify that all tests have been conducted; procedures and equipment are in place and in good working condition before endorsing permits; terminate entry if required and verify rescue services are available and able to contact. They must also determine when shifts and entry supervisors change, and that acceptable conditions, as specified in the permit, continue.

1.2.6 Rescue Services

Rescue services may be provided by on-site employees or an off-site service. On-site teams must be properly trained and have complete knowledge in the use of personal protective and rescue equipment, and first aid, including CPR. Outside services will be made aware of the hazards of confined spaces; must be provided with adequate information in a permitted space hazard exposure situation to aid in rescue and treatment of employees.

1.2.7 Contractors

Host employees must provide information to contractors on permitted spaces program; procedures; and likely hazards the contractor might encounter. Joint entries must be coordinated; and the contractor debriefed at the conclusion of the entry operations.

2.0 PRACTICES AND PROCEDURES

2.1 Definitions

Acceptable Entry Conditions: The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Attendant: An individual stationed outside one or more permit spaces, who monitors the authorized duties assigned in the employer's permit space program.

Authorized Entrant: An employee who is authorized by the employer to enter a permit space.

Blanking or Binding: The absolute closure of a pipe, line, or duct by the fastening of a solid place (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Double Block and Bleed: The closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency: Any occurrence, including any failure of hazard control or monitoring equipment, or event internal or external to the permit space that could endanger entrants.

Engulfment: The surrounding and effective capture of person by liquid of finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or they can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry: The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuring work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry Permit: The written or printed document that is provided by the employer to allow and control entry into permit space.

Entry Supervisor: The person, such as the employer, foreman, or crew chief, responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

NOTE: An Entry Supervisor also may serve as an attendant or as authorized entrant, as long as that person is trained and equipped, as required by this section, for each role he or she fills. In addition, the duties of Entry Supervisor may be passed from one individual to another during the course of entry operation.

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to set-rescue, cause injury, or acute illness from one or more of the following causes:

1. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

2. Airborne combustible dust at a concentration that meets or exceeds its LFL;

NOTE: This concentration may be approximated as a condition in which the dust obscures visions at a distance of 5 feet (1.52m) or less.

3. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

4. Atmospheric concentration of any substance for which a dose or a permissible exposure limit which could result in employee exposure in excess of its dose or permissible limit.

Hot Work Permit: The employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately Dangerous to Life or Health: (IDLH) Any condition that poses an immediate or delayed threat to life that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape from a permit space.

Inerting: The displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Isolation: The intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic materials, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Non-Permit Confined Space: A confined space that does not contain, or with respect to atmospheric hazards, have potential to contain any hazard capable of causing death or serious physical harm.

Oxygen Deficient Atmosphere: An atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen Enriched Atmosphere: An atmosphere containing more than 23.5 percent oxygen by volume.

Permit-Required Confined Space: A confined space that has one or more of the following by volume:

1. Contains or has potential to contain a hazardous atmosphere;

2. Contains a material that has the potential for engulfing an entrant;

3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

4. Contains any other recognized serious safety or health hazard.

Prohibited Conditions: Any condition in a permit space that is not allowed by this permit during the period when entry is authorized.

Retrieval System: The equipment which is comprised of a retrieval line, chest or full-body harness, whistles, if appropriate, and a lifting device or anchor, used for non-entry rescue of persons from permit space.

Testing: The process by which the hazards that may confront entrance of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

3.0 PROCEDURES FOR ATMOSPHERIC TESTING

Atmospheric testing is required for two distinct purposes; evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

1. Evaluation Testing: The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmosphere that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, should be done by, or reviewed by a technically qualified professional (e.g., OSHA consultant service, or certified industrial hygienist, registered safety engineer, certified safety professional, etc.) based on evaluation of all serious hazards.

2. Verification Testing: The atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry within the range of acceptable entry conditions. Results of testing (i.e. actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

3. Duration of Testing: Measurement of valves for each atmospheric parameter should be

made for at least the minimum response time of the test instrument specified by the manufacturer.

4. Testing Stratified Atmosphere: When monitoring for entries involving a descent into atmosphere that may be stratified, the atmospheric envelope should be tested to a distance of approximately 4 feet (1.22m) in the direction of travel and to each side. If sampling probe is sent, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

4.0 SPACE ENTRY PROCEDURES: SEWERS/TANKS

- Presence of Toxic Gasses - Equal to or more than 10 ppm hydrogen sulfide. If the presence of other toxic contaminants is suspected. Entry will be denied until abated.
- Presence of Explosive/Flammable Gases - Equal to or greater than 10% of the lower flammable limit (LFL). Entry will be denied until abated.
- Oxygen Deficiency - A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume. Entry will be denied until acceptable levels are reached.

4.1 Entry without Permit/Attendant

Certification - Confined space may be entered without the need for a written permit or attendant provided that:

1. The space is determined not to be a permit required space, or
2. The space can be maintained in a safe condition for entry by mechanical ventilation alone.

All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter an enclosed/confined space shall have successfully completed, at a minimum, the training as required by the sections of these procedures. A written copy of operating and rescue procedures as required by these procedures shall be at the work site for the duration of the job. The Confined Space Pre-Entry Checklist must be completed by the Entry Supervisor before entry into a confined space. (The Confined Space Permit form will be used as a checklist in this situation). This list verifies completion of items listed below. This checklist shall be kept at the job site for the duration of the job. If circumstances dictate an interruption in the work, permit space must be re-evaluated and a new checklist must be completed.

4.2 Control of Atmospheric and Engulfment Hazards

- Pumps and Lines: All pumps and lines which may reasonably cause contaminants to flow into the space shall be disconnected, blinded and locked out, or effectively isolated by other means to prevent development of dangerous air contamination or engulfment. Not all laterals to sewers or storm drains require blocking. However, where experience or knowledge of industrial use indicates there is a reasonable potential for contamination of air or engulfment into occupied space, then all affected laterals shall be blocked. If blocking and/or isolation require entry into the space the provisions for entry into a permit-required confined space must be implemented.

- Surge Flow and Flooding: Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might suddenly flood by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into space during emergencies by industrial transportation accidents.

- Surveillance: The surrounding areas shall be surveyed to avoid hazards such as drifting vapors from the tanks, piping, or sewers.

- Testing: The atmosphere within the space will be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. An alarm only type gas monitor may be used. Testing shall be performed by the lead Worker who has successfully completed the Gas Detector training for the monitor he will use. The minimum parameters to be monitored are oxygen deficiency, LFL, and hydrogen sulfide concentration. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. The supervisor will certify in writing, based upon the results of the pre-entry testing, that all hazards have been eliminated. Affective employees shall be able to review the testing results. The most hazardous conditions shall govern when work is being performed in two adjoining areas.

- Entry Procedures: If there are no non-atmospheric hazards present and if the pre-entry tests show there are no dangerous air contamination and/or oxygen deficiency within the space and there is no reason to believe that any is likely to develop, entry into work within may proceed. Continuous testing of the atmosphere in the immediate vicinity of the workers within the space when any of the gas monitors alarm set points are reached as defined. Workers will not return to the area until the **Supervisor** who has completed the gas detector training has used a direct reading detector to evaluate the situation and has determined that it is safe to enter.

- Rescue: Arrangements for rescue services are not required where an entry permit is not required. See the rescue portion for instructions regarding rescue planning where an entry is required.

4.3 Entry Permit Required

- Permits: Confined Space Entry Permit. All spaces shall be considered permit required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter a permit-required confined space shall have successfully completed, as a minimum, the training as required by the following sections of these procedures. A written copy of the operating and rescue procedures as required by these procedures. A written copy of the operating and rescue procedures shall be at the work site for the duration of the job.

The Confined Space Entry Permit must be completed before approval can be given to enter a permit-required confined space. This permit verifies completion of items listed below. This permit shall be kept at the job site for the duration of the job. If circumstances cause an interruption in the work or change the alarm condition for which entry was approved, a new Confined Space Entry Permit must be completed.

4.3.1 Control of Atmosphere and Engulfment Hazards

- Surveillance: The surrounding area shall be surveyed to avoid hazards such as drifting vapors from tanks, piping or sewers.

- Atmospheric Monitoring: Entrants must be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions is encountered: Oxygen concentration less than 19.5 percent; flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above their PEL (10 ppm or 50 ppm, respectively); or, if broad range sensor device is used, at 100 ppm as characterized by its response to toluene. Normally, the oxygen sensor/broad range sensor instrument is best suited for space entry. However, substance specified devices should be used whenever actual contaminants in space line work to monitor the atmosphere be carried and used by the entrant of any deterioration of atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

- Space Ventilation: Mechanical ventilation systems, where applicable, shall be set at 100% outside air. Where possible, open additional manholes to increase air circulation. Use portable blowers to augment natural circulation if needed. After a suitable ventilating period, repeat the testing. Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated.

- Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels;

- The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop;

    - It is not feasible to provide for ready exit from spaces equipped with automatic fire suppression systems to deactivate such systems; or

- An emergency exists and it is not feasible to wait for pre-entry procedures to take effect.

All personnel must be trained. A self-contained breathing apparatus (SCBA) shall be worn by any person entering the space. At least one worker shall stand by the outside of the space ready to give assistance in case of emergency. The standby worker shall have an SCBA available for immediate use. There shall be at least one additional worker within sight or call of the standby worker. Continuous powered communications shall be maintained between the worker within the confined space and standby personnel.

If at any time there is any questionable or non-movement by the worker inside, a verbal check will be made. If there is no response, the worker will be moved immediately. Exception: If the worker is disabled due to falling or impact, he/she shall not be removed from the confined space unless there is immediate danger to his/her life. Local fire department rescue personnel shall be notified immediately. The standby worker may only enter the confined space in case of an emergency (wearing the SCBA) and only after being relieved by another worker. Safety belt and harness with attached lifeline shall be used by all workers entering the space with the free end of the line secured outside the entry opening. The standby worker shall attempt to remove a disabled worker via his lifeline entering the space.

When dangerous air contamination is attributable to flammable and/or explosive substances, lighting and electrical equipment shall be Class 1, Division 1 rated per National Electrical Code and no ignition sources shall be introduced to the area.

Continuous gas monitoring shall be performed during all confined space operations. If alarm conditions change adversely, entry personnel shall exit the confined space and a new confined space permit issued.

Rescue: Call the fire department services for rescue. Where immediate hazards to injured personnel are present, workers at the site shall implement emergency procedures to fit the situation.

Special Equipment: Entry into large bore sewers may require use of special equipment. Such equipment might include such items as atmospheric monitoring devices with automatic audible alarms, escape SCBA with approved self-rescuer, and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

EXHIBIT 1
VESSEL OR CONFINED SPACE ENTRY PERMIT

NAME OF VESSEL OR CONFINED SPACE:

_____

LOCATION:

_____

PURPOSE OF ENTRY: _____

DATE & TIME: _____

PREPARATIONS	**YES**	**NO**	**HAZARDOUS**	**YES**	**NO**
Forced Ventilation			Rail Car Motion		
Breathing Air (Full face & escape cylinder)			Toxic Material		
Acid Suit			Flammable Materials		
Vapor Proof Suit			Hot Material		
Coveralls/Goggles			Welding/Burning		
Harness and Life Line			Internal Plugs		
Air Analyzer			External Fume Source		
Chemical Gloves			External Fire Source		
Ear Protection					
Lighting/Flashlight					
Barricades			**ELECTRICAL**		
Safety Shower Checked			Ground Vessel		
Scaffold (Inside Vessel)					
Ground Fault Interrupter					
Entry Ladder					
Vapor Proof Lighting					
V/C.S. Video					

Confined Space Entry Program

PREPARATIONS	YES	NO	HAZARDOUS	YES	NO
Disconnect Elect. Tracing					

EVACUATION	YES	NO	ISOLATION	YES	NO
	(Mark and N/A When Not Applicable				
Safety Person - No. Required			Lock Out Valves		
Call Person - No. Required			Disconnect Pipes		
Breathing Air (SCBA)			Blank Pipes		
Escape Respirator			Disconnect Agitator Coup		
Air Horn			Pull Fuses		
Flashlight			Disconnect Motor Leads		
Hoist/Pulley			Remove Changing Chute		
Litter/Stretcher			Remove Stack		
2 way Radios					

EXHIBIT 2
VESSEL OR CONFINED SPACE ENTRY PERMIT
AIR ANALYSIS
(With Forced Ventilation Shut Off)

TIME/INITIAL	OXYGEN	FLAME	TOXIC

CONTINUOUS AIR TESTING (WHEN PERSON IS IN CHAMBER)

SIGNATURE PERSON(S)	SAFETY PERSON(S)	CALL PERSON(S)	ENTERING

***WAIVER REQUIRED: (EXPLAINED BELOW)**

PERSONNEL LIST		
AREA OWNER	**TELEPHONE NUMBER.**	**TIME/DATE**
ENGINEER/COORDINATOR	**TELEPHONE NUMBER.**	**TIME/DATE**
CRAFT SUPERVISOR	**TELEPHONE NUMBER.**	**TIME/DATE**
SAFETY	**TELEPHONE NUMBER.**	**TIME/DATE**

APPROVALS TO ENTER VESSELS OR CONFINED SPACE

Attachment 10
Hazard Communication Program

ATTACHMENT 10

HAZARD COMMUNICATION PROGRAM

This program has been developed to maintain compliance with 29 CFR 1926.59, the Hazard Communication Standard for the Construction Industry, 29 CFR 1910.1200, the Hazard Communication Standard for the General Industry, 29 CFR 1926.65, the Hazardous Waste Operations and Emergency Response Regulations for the Construction Industry and 29 CFR 1910.120, the Hazardous Waste Operations and Emergency Response Regulations for the General Industry. This Hazard Communication Program applies to all hazardous chemicals used at job sites, however it does not apply to Hazardous Waste as defined by the Solid Waste Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency (EPA).

1.0 LABELS AND OTHER FORMS OF WARNING:

1) All containers of hazardous chemicals must be labeled, tagged, or marked with:

   a. The identity of the hazardous chemical contained therein;

   b. Appropriate hazard warnings.

   No employee shall remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

2) The contents of all storage tanks are identified by the Tank Numbers on the storage tanks. The Tank Numbers will also be noted on the appropriate MSDS.

3) If the required information is not conveyed on the existing labeling of an incoming container, immediately notify the Manager of Regulatory Affairs in order to have new labels affixed.

4) Portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer, are not required to be labeled.

2.0 MATERIAL SAFETY DATA SHEETS:

1) A copy of the Material Safety Data Sheet (MSDS) that meets the requirements of 29CFR 1910.1200 (g)(2) for every hazardous chemical, used at the job site, must be kept in each appropriate work area.

2) If no MSDS is on file for a hazardous chemical in use, or does not arrive with first shipment, immediately notify the Safety Officer so one may be obtained.

3) Should new significant health information become available for a hazardous chemical, an updated MSDS will immediately be requested from the manufacturer by the Safety Manager.

3.0 EMPLOYEE INFORMATION AND TRAINING:

1) Employees shall be informed of:

   a. The requirements of the Hazard Communication Standards (29 CFR 1926.59 and 1910.1200);

   b. Any operations in their work area where hazardous chemicals are present;

   c. The location and availability of this written program, the required list of hazardous chemicals, and MSDSs.

2) Employee training shall include:

   a. Methods and observations to be used to detect the presence or release of a hazardous chemical;

   b. The physical and health hazards of the chemicals in the work area;

   c. Measures or procedures the employee can take to protect themselves from exposure to hazardous chemicals (i.e. standard work practices, emergency procedures, appropriate safety equipment);

d. The details of this program, including an explanation of the labeling system and MSDSs, and how employees can obtain and use the appropriate information.

3) All training will be conducted by the Environmental Safety/Compliance Manager, or his designee.

4) Training will be presented by:

a. A slide presentation covering classes, labels, and marking of hazardous chemicals and the hazard communication requirements - "Classes/Labels/Markings of Hazardous Chemicals" along with a handout supplying definitions of the various physical and chemical hazards.

b. A review of the site's written Hazard Communication Program covering the locations of the written program; the location and appropriate hazards and protective equipment to be used for each hazardous chemical at job sites, and how to read and understand an MSDS.

5) Training will be performed for new employees prior to their initial assignment. In addition, employee's training will be updated whenever a new hazard is introduced into the workplace through regular weekly safety meetings.

4.0 CONTRACTORS:

Contractors will be notified of all chemical hazards in their work area, any special instructions and all required safety equipment as outlined in the CONTRACTOR NOTIFICATION PROCEDURE (Attachment A).

5.0 HAZARDS FOR NON-ROUTINE TASKS - CONFINED SPACE ENTRY:

Anyone entering a confined space will follow the Confined Space Entry Procedures as described in Attachment 9 of this HASP, and be informed of the hazards to be encountered in the confined space, prior to entry, by the person completing the confined space entry permit.

RIGHT TO KNOW LAW

(180 Laws of New York - Chapter 551)

The "Right To Know" Law maintains that workers have an inherent right to know all of the health hazards associated with their exposure to toxic substances for two reasons:

1) Employees have a right to make an informed decision about the possible costs of employment to health and life.

2) Employees can observe symptoms of toxicity in themselves, understand the relationship between the symptoms and exposure, and can therefore evaluate the need for any corrective action.

6.0 EMPLOYEE RIGHTS:

- Employees or their representatives may request and must receive, upon request, all information concerning the hazards of toxic substances in the workplace.

- An employee may refuse to work with a toxic substance if he has requested information about it and has not received the written reply within 72 hours (3 working days, excluding weekends and public holidays) of its receipt by the employer.

- An employee may exercise any right pursuant to, or directly related to, the "Right To Know" Law without fear of any discrimination what so ever.

- An employee must not be required to waive any rights under the "Right To Know" Law as a condition of employment.

- An employee may file a complaint with the Department of Labor if he or she has been discriminated against in violation of the "Right To Know" Law.

MSDS COPY REQUEST

Name: _____

The substance to which I am routinely exposed, and for which I am requesting a copy of a Material Safety Data Sheet is:

_____

_____

(Employee must use a separate request for each Material Safety Data Sheet requested)

My reason for requesting this information is:

_____

_____

_____

_____ _____

(Employee Signature) (Date)

☐ I have received a copy of the

MSDS, which I requested. _____

(Employee Signature/Date)

☐ A copy of the MSDS for _____which you have requested is not available. We are making every effort to obtain a copy from our supplier.

_____ _____

(Compliance Manager (Safety) (Date)

_____ _____

(Employee Signature) (Date)

GENERAL TOXICOLOGY PRINCIPALS

ACUTE EFFECTS: Health effects from exposure to a toxin for less than 24 hours, and it usually refers to a single continuous exposure to a high concentration of a chemical. Acute exposures to chemicals are rapidly absorbed and is likely to produce immediate toxic effects, but acute effects can also produce delayed toxicity that may or may not be similar to the toxic effects of chronic exposure.

CHRONIC EFFECTS: Health effects from repeated exposures to a toxin for more than three months. Chronic effects tend to occur at a delayed time after the exposure, which is known as the latency period.

DISTINCTION BETWEEN TOXICITY AND HAZARD: An extremely toxic chemical that is sealed in a container and stored properly poses very little hazard. On the other hand, drinking five gallons of water, which is not toxic, in one sitting could be very hazardous.

DOSE-RESPONSE RELATIONSHIP: Refers to the measurement and analysis of the doses, or levels of exposure, at which toxic effects will occur.

HAZARD: The degree of probability that an injury or illness will occur under the specified conditions of use of a product.

HAZARDOUS CHEMICALS: Any chemical which is a physical or health hazard?

HEALTH HAZARD: A chemical for which there is significant evidence that acute or chronic health effects may occur in exposed employees.

LATENCY PERIOD: The period of time between the initial exposure and the onset of symptoms related to the toxic effects of the exposure. Toxins associated with long latency periods are of a concern since the lack of an immediate effect generates a lack of caution when it comes to wearing personal protective equipment.

LD50: A single dose of a material, which on a basis of laboratory tests, is expected to kill 50% of a group of test animals. The LD50 is usually expressed as milligrams of materials per kilogram of animal body weight (mg/Kg).

LC50: The concentration of a material in air, which, on the basis of laboratory tests, is expected to kill 50% of a group of test animals when administered as a single exposure. The LC50 is expressed as parts of a material per million parts of air, by volume (ppm) for gases and vapors, or as milligrams of material per cubic meter of air (mg/m^3) for dusts, mists, and fumes.

PHYSICAL HAZARD: A chemical that is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water reactive.

SUBCHRONIC EFFECTS: Health effects from repeated exposures to a toxin for less than three months.

TOXICITY: The ability of a chemical to produce harmful effects.

HEALTH HAZARDS

CARCINOGEN: Causes cancer

CORROSIVE: A chemical that causes visible destruction of, or irreversible alterations to living tissue (i.e. hydrochloric acid, sulfuric acid).

EXTREMELY TOXIC: A chemical that has:

1) An LD50 single oral dose for rats of less than 1 milligram per kilogram (mg/Kg) of body weight, or;

2) An LC50 4-hour vapor exposure for rats of less than 10 parts per million (ppm), or;

3) An LD50 skin exposure to rabbits of less than 5 mg/Kg of body weight, or;

4) A probable lethal dose to humans of less than 1 grain (one taste).

HIGHLY TOXIC: A chemical that has:

1) An LD50 single oral dose for rats of greater than 1 mg/Kg of body weight, but less than 50 mg/Kg of body weight, or;

2) An LC50 4-hour vapor exposure for rats of greater than 10 ppm, but less than 100 ppm, or;

3) An LD50 skin exposure to rabbits of greater than 5 mg/Kg of body weight, but less than 43 mg/Kg of body weight, or;

4) A probable lethal dose to humans of greater than 1 grain (1 taste), but less than 4 cubic centimeters (cc) (1 teaspoon).

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH): Any condition that poses an immediate or delayed threat to life that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape from a permit space.

IRRITANT: A substance that produces an irritating effect when it contacts skin, eyes, nose, or respiratory system (e.g. tear gas).

SENSITIZER: A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

TARGET ORGAN EFFECTS: Effects on specific body organs by certain chemicals (i.e. carbon tetrachloride - causes liver damage).

TOXIC: A chemical that has:

1) An LD50 single oral dose for rats of greater than 50 mg/Kg of body weight, but less than 5,000 mg/Kg of body weight, or;

2) An LC50 4-hour vapor exposure for rats of greater than 100 ppm, but less than 10,000 ppm, or;

3) An LD50 skin exposure to rabbits of greater than 43 mg/Kg of body weight, but less than 2,810 mg/Kg of body weight, or;

4) A probable lethal dose to humans of greater than 4 cc (1 teaspoon), but less than 1 pint (250 grams).

COMBUSTION DEFINITIONS AND PROPERTIES

AUTOIGNITION TEMPERATURE: The temperature at which a material will ignite without an external source of ignition.

BOILING LIQUID EXPANDING VAPOR EXPLOSION (BLEVE): Occurs when a liquefied flammable gas containers is heated up and causes the liquid to boil and change to a gas, which expands and causes the container to explode.

DEFLAGRATION: An explosion, which occurs slower than the speed of sound, and produces no shock wave.

DETONATION: An explosive chemical reaction with a rate of less than $1/100^{th}$ of a second.

EXOTHERM: Any material which is capable of releasing energy when it burns.

EXPLOSION: Effect produced by the sudden and violent expansion of gases, which may or may not be accompanied by shock waves, or disruption of the enclosing materials.

FIRE POINT: The temperature, usually about five to ten degrees above the flash point at which the ignitable mixture will continue to burn.

FLAMMABILITY/EXPLOSIVE LIMITS:

Lower Flammable Limit (LFL): The point at which an air and vapor mixture is too lean for combustion.

Upper Flammable Limit (UFL): The point at which an air and vapor mixture is too rich for combustion.

Lower Explosive Limit (LEL): When the concentration of a material is too small for an explosion to occur.

Upper Explosive Limit (LEL): The level at which there is too much material present for an explosion to occur.

FLASH POINT: The lowest temperature at which a material gives off enough vapors to form an ignitable mixture.

SPONTANEOUS COMBUSTION: Occurs when combustible solids are heated to the ignition point by an internal source of heating.

PHYSICAL HAZARDS

COMBUSTIBLE LIQUID: Having flash points at or above 100 □F but below 200 □F (e.g. fuel oils, ethylene glycol).

COMPRESSED GAS: A gas having a pressure exceeding 40 psi at 70 □F or;

- $ A gas having a pressure exceeding 40 psi at 130 □F regardless of the pressure at 70 □F or;
- $ A liquid having a vapor pressure exceeding 40 psi at 100 □F (e.g. LP Gas, acetylene, hydrogen).

EXPLOSIVE: A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

FLAMMABLE:

Aerosol: Yields a flame projection exceeding 18 inches at full valve opening or a flashback at any degree of valve opening.

Gas: Forms a flammable mixture with air at a concentration of 13% by volume or less, or forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit.

Liquid: Has a flash point below 100 □F (e.g. acetone, gasoline, methyl alcohol)

Solid: A solid, other than blasting agent or explosive, that is liable to cause fire through friction, absorption, moisture, spontaneous chemical change, or retained from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard (e.g., magnesium powder).

ORGANIC PEROXIDE: A chemical that is explosively sensitive to heat, shock, or friction and is potentially toxic (e.g., benzoyl peroxide).

OXIDIZER: A chemical other than a blasting agent or explosive, that initiates or promotes combustion in other materials, there by causing fire either of itself or through the release of oxygen or other gases (e.g., ammonium nitrate fertilizer, hydrogen peroxide solution).

PYROPHORIC: A chemical that will ignite spontaneously in air at a temperature of 130 °F or below (e.g., aluminum alkyls, alkyl boranes).

UNSTABLE (REACTIVE): A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure, or temperature (e.g., picric acid).

WATER REACTIVE: A chemical that reacts with water to release a gas that is either flammable or presents a health hazard (e.g., sodium metal, potassium metal).

NO SMOKING REGULATIONS

Smoking represents a dual hazard in a hazardous waste handling operational area. The first hazard is the flammability danger posed by smoking in areas where flammable materials are stored or handled. The second hazard is the contamination danger whereby toxic materials can be transferred from hands (gloves) to cigarettes and inhaled or ingested during smoking.

PRECAUTIONS:

- Do not smoke in operational areas.
- ***Always wash hands prior to smoking (or eating).***

HAZARDOUS CHEMICALS

HAZARDOUS CHEMICALS	HAZARD
Arsenic (Inorganic compounds, as As)	Metal, silver gray or tin-white, brittle, odorless solid. Noncombustible solid in bulk form, but a slight explosion hazard of dust when exposed to flame. **Lung and lymphatic carcinogen** OSHA PEL 8-hr TWA – 0.010 mg/m^3; **IDLH – 5 mg/m^3** *PPE: Use rubber glove and safety shoes, full-body coverall (Tyvek suit), High Efficiency Particulate P100 respirator, face shield, if exposure is over 10 times the OSHA Permissible Exposure Limit (PEL) use any self-contained breathing apparatus that has a full facepiece and is operated in a pressure demand mode.*
Benzene	Class 1B flammable liquid, flash point below 73^{0}F and boiling point above 100^{0}F. Inhalation, skin absorption and ingestion hazard, exhibits toxic effects on the eyes, skin, respiratory system, blood, central nervous system, and bone marrow. Symptoms include irritation to the eyes, skin, nose and respiratory system; giddiness; headache, nausea, staggered walk; fatigue, anorexia, weakness, exhaustion; dermatitis; bone marrow depressant; possibly leukemia. OSHA PEL 8-hr TWA - 1 ppm; 15 min STEL 5 ppm *PPE: Use rubber glove and safety shoes, full-body chemical protective clothing, full-face powered air purifying respirator with organic vapor cartridge. If exposure is over 10 times the OSHA Permissible Exposure Limit (PEL) use any self-contained breathing apparatus that has a full facepiece and is operated in a pressure demand mode*
Chlorinated hydrocarbons (CHC)	Normally combustible liquids with low vapor pressures. Inhalation, ingestion, and skin absorption hazard, exhibits toxic effects on the eyes, skin, respiratory system, and central nervous system, liver and kidneys. Symptoms include eye and nose irritation, drowsiness, dermatitis, chemical pneumonia, narcosis, and cracked skin, potential liver and kidney carcinogens. OSHA Permissible Exposure Limit: Varies with compound *PPE: Use full body chemical protective clothing, organic vapor cartridge respirator, rubber gloves, safety glasses, or goggles. If over 10 times PEL, any self-contained breathing apparatus in pressure demand mode.*
Lead	Non-combustible metal. Exhibits toxic effects to the gastrointestinal tract, central nervous system, kidneys, blood, gum tissue, and the eyes. Symptoms include weakness, exhaustion, insomnia, facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, gum lead line, tremor, paralysis of the wrist and ankles, encephalopathy, kidney disease, eye irritation, low birth weight in the female, infertility in the male, and hypertension. OSHA PEL 8-hr TWA – 50.0 µg/m^3; Action Level 8-hr TWA - 30.0 µg/m^3 *PPE: Use rubber glove and safety shoes, full-body coverall (Tyvek suit), High Efficiency Particulate P100 respirator and face shield, if exposure is over 10 times the OSHA Permissible Exposure Limit (PEL) use any self-contained breathing apparatus that has a full facepiece and is operated in a pressure demand mode*

HAZARDOUS CHEMICALS	HAZARD
Mercury	Metal, non-combustible liquid. Inhalation, skin absorption and ingestion hazard. Exhibits toxic effects to the eyes, skin, and respiratory system. Central nervous system, and kidneys. Symptoms include irritation to the eyes and skin; cough, chest pain, dyspnea (difficulty breathing), bronchitis, pneumonitis; tremors; insomnia, irritability, indecision, headaches, fatigue, weakness, stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss, proteinuria OSHA Permissible Exposure Ceiling Limit: 8-hr TWA: 0.1 mg/m^3 **Immediately Dangerous to Life and Health at 100 x OSHA Permissible Exposure limit (PEL)** *PPE: Use rubber glove and safety shoes, full-body chemical protective clothing. Up to OSHA PEL, full face air purifying respirator with mercury cartridge filter; up to 10 x PEL, full face powered air purifying respirator with mercury cartridge filter; over 10 x PEL, use any self-contained breathing apparatus that has a full facepiece and is operated in a pressure demand mode*
Naphthalene (Tar comphor, white tar)	Organic solid. Colorless to brown solid with an odor of mothballs (normally shipped as a molten solid). Combustible solid, but will take some effort to ignite. OSHA PEL 8-hr TWA – 50 mg/m^3; **IDLH – 250 mg/m^3** *PPE: Use rubber glove and safety shoes, full-body coverall (Tyvek suit), Chemical cartridge respirator in combination with High Efficiency Particulate P100 respirator, face shield, if exposure is over 10 times the OSHA Permissible Exposure Limit (PEL) use any self-contained breathing apparatus that has a full facepiece and is operated in a pressure demand mode.*
Petroleum Based Hydrocarbons	Flammable liquids. Inhalation, ingestion, and skin absorption hazard, exhibits toxic effects on the eyes, skin, respiratory system, and central nervous system, liver and kidneys. Symptoms include eye and nose irritation, drowsiness, dermatitis, chemical pneumonia, narcosis, and cracked skin. OSHA Permissible Exposure Ceiling Limit: 8-hr TWA: 500 ppm **Immediately Dangerous to Life and Health at 10% LEL, approximately 2.2 x OSHA Permissible Exposure limit (PEL)** *PPE: Use full body chemical protective clothing, organic vapor cartridge respirator, rubber gloves, safety glasses, or goggles. If over 10 times PEL, any self-contained breathing apparatus in pressure demand mode.*
Volatile Organic Compounds (VOC)	Flammable hydrocarbons with low vapor pressures. Inhalation, ingestion, and skin absorption hazard, exhibits toxic effects on the eyes, skin, respiratory system, and central nervous system, liver and kidneys. Symptoms include eye and nose irritation, drowsiness, dermatitis, chemical pneumonia, narcosis, cracked skin, chlorinated VOCs may be potential liver and kidney carcinogens. *PPE: Use full body chemical protective clothing, organic vapor cartridge respirator, rubber gloves, safety glasses, or goggles. If over 10 times PEL, any self-contained breathing apparatus in pressure demand mode.*

POTENTIALLY HAZARDOUS OPERATIONS, ASSOCIATED AIR CONTAMINANTS AND RECOMMENDED PPE

Process Type	*Contaminant Examples*	*Recommended PPE*
Solid Operations: Pouring; Mixing; Separations; Extraction; Crushing; Conveying; Loading; Bagging	*Dusts:* Arsenic, Lead; Mercury; Cement; Quartz (free silica); Fibrous glass	Employ engineering controls such as work area containment and ventilation. PPE: Use rubber glove and safety shoes, full-body coverall (Tyvek suit), High Efficiency Particulate P100 respirator, face shield, if exposure is over 10 times the OSHA Permissible Exposure Limit (PEL) use any self-contained breathing apparatus that has a full facepiece and is operated in a pressure demand mode. If Mercury is present use mercury chemical cartridge in combination with P100 and OV filters.

ATTACHMENT A

CONTRACTOR NOTIFICATION PROCEDURE

In order to ensure the safety of contractors performing work at this facility, the following procedures must be followed:

- At the time a contractor is hired, the attached Contractor's Notice (Attachment A) must be delivered to the contractor informing them of the rules that must be followed at this facility.
- The Facility Notification of Contractor Work (Attachment B) must be completed and forwarded to the Corporate Safety Officer by the person hiring the contractor.
- The bottom portion of the FACILITY NOTIFICATION will then be completed, signed, and returned to the originator indicating any special instructions or safety equipment required. This information is to be relayed to the contractor by the person hiring them prior to the contractor beginning work.
- A new FACILITY NOTIFICATION must be completed prior to the contractor working in an area different than was authorized in the notification.
- A copy of the authorized FACILITY NOTIFICATION with any special instructions and/or additional safety equipment will be forwarded to the Site Safety Officer. The Site Safety Officer will verify that all contractors' employees have the required safety equipment as outlined in the FACILITY NOTIFICATION before being allowed access to the facility.
- The Site Safety Officer will not admit any contractor without an authorized FACILITY NOTIFICATION.
- Prior to allowing a contractor access to the facility, the Site Safety Officer will contact the Department Manager or Foreman for the area the work is to be performed. (Note: This will be indicated on the FACILITY NOTIFICATION). The Department Manager or Foreman will complete and sign the WORK PERMIT (Attachment C) authorizing the contractor to work in the specified area for that immediate work shift indicating any special instructions for the contractor on the permit.
- The contractor will retain the WORK PERMIT until the end of the shift. He will then return it to the Site Safety Officer when signing out.

ATTACHMENT B

FACILITY NOTIFICATION OF CONTRACTOR WORK

CONTRACTOR: _____

ADDRESS: _____

APPROXIMATE NUMBER OF EMPLOYEES PERFORMING WORK FOR THE REMEDIATION CONTRACTOR: _____

DATE WORK IS TO BEGIN: _____

AREA(S) WHERE WORK IS TO BE PERFORMED: _____

_____

WORK TO BE PERFORMED: _____

_____

APPROXIMATE DURATION OF PROJECT: _____

PERSON HIRING CONTRACTOR: _____

SPECIAL INSTRUCTIONS: _____

_____

ADDITIONAL SAFETY EQUIPMENT REQUIRED: _____

_____

CHEMICAL HAZARDS IN WORK AREA: _____

_____

AUTHORIZATION: _____

DATE: _____

ATTACHMENT C

WORK PERMIT

DATE: _____

SHIFT: _____

CONTRACTOR: _____

WORK AREA: _____

SPECIAL INSTRUCTIONS:

_____

_____

_____

_____

DEPARTMENT MANAGER: _____

ATTACHMENT D

SAFETY ORIENTATION - AWARENESS TRAINING

FOR AUTHORIZED EMPLOYEES AND SUBCONTRACTORS

NAME OF JOB-SITE:
PRESENTED BY:
DATE/TIME/LOCATION:

AWARENESS TRAINING OUTLINE REVIEWED WITH ACKNOWLEDGMENT SHEET ATTACHED:

I. INTRODUCTION

1) Corporate Safety Statement

2) Safety Program Synopsis

3) Conduct on Customers Property

4) Fitness for Duty Program

5) Brief review of following sections of Subpart C - General Safety and Health Provisions:

- 1926.20(a) Contractor requirements: Must maintain site free of conditions that are "unsanitary, hazardous, or dangerous to health or safety". OSHA's definition of a "Competent Person".
- 1926.21 Safety Training and Education: employees must be instructed in recognition, avoidance and prevention of unsafe conditions.
- 1926.23 First Aid & Medical Attention. Access to medical records and confidentiality.
- 1926.25 Housekeeping

6) Brief review of the following sections of Subpart D:

- 1926.51 Sanitation; Potable/non-potable water; toilets/washing facilities; Food handling.
- 1926.1101 Asbestos; only certified personnel may handle asbestos containing materials.

\$ 1926.65 Hazardous Materials - only certified personnel may handle hazardous materials.

II. HAZARD COMMUNICATION (1926.59; 1910.1200)

1) Purpose of standard

2) Sources of information: Material Safety Data Sheets (MSDS), labels

3) Material Safety Data Sheets:

- Materials for which required
- Definition of basic terminology:
  - flammable/combustible liquids
  - flash point
  - corrosive
  - chronic/acute exposures
  - routes of entry (give examples, particularly of inhalation)
  - target organs
- Review sample MSDS
- Right of access and location of MSDS

4) Labeling

- Requirements for labeling - all containers must be labeled.
- Alternative methods (signs, placards, batch ticket, etc.)

5) Process Safety Management (1926.64; 1910.119)

- Prevent catastrophic releases hazardous chemicals

III. PERSONAL PROTECTIVE EQUIPMENT (1926 SUBPART E)

1) Head Protection (1926.100; 1910.135)

- General requirements - hard hats required at all times
- ANSI standards
- Care for and inspection

2) Hearing Protection (1926.101; 1926.52; 1910.95)

- Brief review of Occupational Noise Exposure requirements (decibel levels, effect on hearing, audiometric exams)
- Hearing protection types; noise reduction ratings
- Signs for posted areas

3) Eye and Face Protection (1926.102, 1910.133)

- ANSI Safety Glasses required at all times (Z-87)
- Review selection guide for types of protection

4) Respiratory Protection (1926.103, 1910.134)

- Proper use and limitations of respirators (half and full face)
- Requirements for fit testing and ability to wear determination
- Fit check procedures when donning
- Care for, cleaning, inspection, and storage

5) Other

- Safety shoes
- Gloves
- Protective clothing and chemical protection
- Electrical protection

IV. FIRE PROTECTION (1926 SUBPART F)

Remediation Contractor Personnel are not fire fighters. Use of extinguishers is for inception stage only. Immediately call for professional firefighters.

1) Concept of fire triangle

2) Classes of fire

3) Extinguisher types appropriate for hazard

4) Hands on demonstration of use (when permissible)

5) Flammable/combustible liquid storage

6) Approved safety cans for flammable liquids

7) Quantities limitations for storage

8) Bonding/grounding requirements

9) Maintain access to exits, emergency equipment

10) Hot Work Permits

11) Temporary heating devises (1926.154)

V. FALL PROTECTION (1926 SUBPART M)

1) Six (6) foot elevation requirement

2) Design specifications for lifelines and lanyards

3) Show how to wear harness properly

4) Inspection if the responsibility of worker to be performed prior to putting on

5) Ladders

- Condition of ladders
- Proper pitch and securing/tie off
- Rails extend 36" above landing

6) Guarding floor and wall openings (1926.500)

- General description of when guardrail protection is required

7) Crane suspended personnel platforms (1926.550 (g) - If used

8) Aerial lifts (1926.556)

- Fall protection requirements must comply when stepping foot within basket
- Only full body harness acceptable (no use of safety "belts")

VI. CONFINED SPACE ENTRY (1910.146)

1) Definition of and examples

2) Permit required/non-permit required spaces

3) Atmospheric testing requirements

4) Rescue plans, retrieval devises

5) Safety monitor responsibilities

VII. LOCKOUT/TAGOUT (1910.147)

1) Applies to all energy sources

2) General purpose & examples of when required

3) Use of lock box technique

4) Must be aware of plant specific procedures

VIII. DEMOLITION (1926 SUBPART T)

1) Engineering Survey

2) Shoring/bracing of walls and floors

3) Utility services/process line disconnects

4) Presence of hazardous materials

- Asbestos; certified workers required
- Lead; requirements to check lead content, work practices and training based on presence of lead.
- Cadmium; requirements to check cadmium content, work practices and training based on presence of cadmium.

5) Protection of floor/wall openings and entrances

IX. GENERAL SAFE WORK PRACTICES

1) Proper body mechanics and lifting techniques

2) Project Emergency and Evacuation Plan

3) Emergency telephone numbers posted in job-site office/trailer.

X. SITE SPECIFIC HAZARDS/TOPICS

SITE SAFETY AND HEALTH ORIENTATION AWARENESS & ACKNOWLEDGMENT

DECLARATION OF UNDERSTANDING
NAME OF JOB-SITE:
PRESENTED BY:
DATE/TIME/LOCATION:

The undersigned have participated in; acknowledge, understand and will follow the safety procedures, rules and guidelines covered during the Remediation Contractor Orientation/Safety Training (copy of topics attached). I understand that copies of all procedures are available to me at any time and I have received copies of all requested procedures. By signing below I understand these safety rules are for my own protection and I will follow them to protect my co-workers the environment and me. I understand these safety rules are a condition of employment and failure to follow safe work practices may result in disciplinary action and/or loss of employment. If I ever believe an unsafe condition may exist I will stop work immediately and contact my foreman/supervisor/project manager.

	NAME	SIGNATURE	EMPLOYEE ID #	DATE
1				
2				
3				
4				
5				
6				
7				

Attachment 11
Respiratory Protection Program

RESPIRATORY PROTECTION PROGRAM

1.0 PURPOSE

The standard established uniform guidelines for complying with the requirements of the Occupational Safety and Health Administration (OSHA) for Respiratory Protection, Title 29, Part 1910, Section 134 of the Code of Federal Regulations, and provides organization-wide procedures for the proper selection, use and care of respiratory protective equipment.

2.0 SCOPE

This standard applies to all remediation projects with which there is a potentially elevated airborne exposure above regulatory permissible exposure limits.

3.0 POLICY

Every consideration will be given to the use of effective administrative and engineering controls to eliminate or reduce exposure to respiratory hazards to the point where respirators are not required in controlling toxic substances, appropriate respiratory protective equipment will be provided by the company at no charge to the employee.

Respiratory protective devices will be appropriate for the hazardous material(s) involved, and the extent and nature of the work requirements and conditions.

Employees required to use respirators will be properly fitted, appropriately tested, medically screened, and thoroughly trained in their use.

4.0 CODES AND REGULATIONS

General applicability of Codes and Regulations. Except to the extent that requirements that are more stringent are written directly into this standard, all applicable codes and regulations have the same force and effect as if copied directly into this standard.

Federal Regulations: Those standards governing the development of this program include, but are not limited to, the following:

- Asbestos Regulations - Industrial

- Title 29, Part 1910 Section 1001 of the Code of Federal Regulations
- Asbestos Regulations - Construction
- Title 29, Part 1926, Section 1101 of the Code of Federal Regulations
- Lead Regulations - Construction
- Title 29, Part 1926, Section 62 of the Code of Federal Regulations
- Respiratory Protection
- Title 29, Part 1910, Section 134 of the Code of Federal regulations, as revised April 8, 1998.
- Access to Employee Exposure and Medical Records
- Title 29, Part 1910, Section 20 of the Codes of Federal Regulations
- NIOSH Approvals for Respirators
- Title 42 CFR 84, of the Code of Federal Regulations, as revised April 8. 1998.
- American National Standards Institute (ANSI)
- American National Standard: Practices for respiratory Protection, Z88, 2-1980, revised 1992.

5.0 DESIGNATION OF ADMINISTRATOR

The designated program administrator if the Corp. Safety Officer who has the responsibility for implementation of, and the adherence to, the provisions of this respiratory protection program. The Corp. Safety Officer will designate a person who is responsible for the enforcement of the program at each job site. This will be the site supervisor/foreman, the ESS or on-site safety coordinator.

In order to comply with OSHA=s Acompetent person@ requirements, the person designated must have two qualifications. He or she must have experience in identifying and controlling exposures, and authority to promptly prevent and correct hazardous conditions.

6.0 PURCHASE OF APPROVED EQUIPMENT

In order to comply with the provisions of OSHA=s Standard on Respiratory Protection, 29 CFR 1910.134, all respiratory protective equipment purchased by the Remediation Contractor will have been tested by the National Institute of Occupational Safety and Health (NIOSH) and will carry a joint NIOSH/MSHA approval number for that specific respirator assembly. All respiratory protective equipment purchased after October 8, 1998 will have been tested by NIOSH and will carry a NIOSH specified approval number for that specific respirator assembly.

7.0 RESPIRATORY SELECTION

In selecting the correct respirator for a given circumstance the following factors must be taken into consideration:

- **Nature of the Hazard** - In order to make subsequent decisions, the nature of the hazard must be identified to ensure that an over exposure does not occur. These include oxygen deficiency, physical properties of the hazard, actual concentrations of the toxic substances, the Permissible Exposure Limits (PEL), and the warning characteristics.
- **Nature of the Hazardous Operations** - For proper respirator selection, it is necessary to know the details of the operations, which require employees to use devices. These include operations or process characteristics, and work characteristics, which may necessitate alternate respirator selection.
- **Location of the Hazardous Area** - This is important in the selection process so that a backup system may be planned, if necessary. Respirable or emergency operations may be planned.
- **Time Respiratory Protection is Required** - The length of time a respirator will have to be worn by an employee is a factor, which must be evaluated. This is most pronounced when using SCBA equipment where, by definition, the air supply is limited. However, time is also a factor during routine use of air purifying respirators when the employee=s breathing and comfort become affected by clogged filter cartridges which may need changing.
- **Employee=s Health** - Effective usage of a respirator is dependent on an individual=s ability to wear a respirator as determined by a physician. Most respiratory devices increase physical stress on the body, especially the heart and lung. Care should be taken to ensure that medical determination has been made that an individual is capable of wearing a respirator for the duration of the work assignment (See Section 11.0 of the Standard).
- **Work Activity** - The type of work activities to be performed while wearing a respirator is vitally important in the respirator selection. The proper respirator will be one, which is least disruptive to the task being conducted, yet providing the desired protection.
- **Respirator Characteristics, Capabilities, and Limitations** - The tables in Exhibits 1 and 2 have been reproduced from ANSI Z99.2-1992. They provide a description of various respirator characteristics, capabilities, and limitations.
- **Protection Factors** - The protection afforded by respirators is dependent upon the seal of the face piece to the face. The degree of protection may be ascertained and a relative safety factor as designed. Protection factors are only applicable if all elements of an effective respirator program are in place and being enforced.

7.1 Selection

Where respirators are used, the Remediation Contractor will select and provide, at no cost to the employees, the appropriate respirator, as specified in the following charts, and will ensure that the employee uses the respirator provided.

Exhibit 3 - Selection Chart for Routine Respirator Use

7.2 Comfort

Once the type of respirator has been selected, that is applicable and suitable for the purpose intended, the selection process should give consideration to the fit and comfort of the respirator. The employee should be given the opportunity to select a respirator, which provides the most comfortable fit. Since each respirator represents a different size and shape, a respirator, which fits better during selection, will provide better protection after fit testing. For this purpose, the employee should be shown how to access a comfortable device and should eliminate those, which are obviously ill fitting.

An assessment of comfort should include the following points:

Chin properly placed
Positioning of mask on nose
Strap tension
Room to talk
Cheeks filled out
Fit across nose bridge
Room for safety glasses
Distance from nose to bridge
Tendency to slip
Hindrance to movement

8.0 ISSUANCE OF EQUIPMENT

When practical, respirators should be assigned to individual employees for their exclusive use and labeled for identification in such a way as not to affect the performance of the respirator.

8.1 Fitting

After the employee has been shown how to assess a respirator, he/she should be shown how to don a respirator, how it should be positioned on the face, how to set strap tension, and how to determine a proper fit.

Note: The instruction should take the form of a review and should not be considered the employee's formal training.

The employee should hold each face piece up to the face and eliminate those, which obviously do not give a comfortable or proper fit. Normally, fitting should start with a half-face mask and if a good fit cannot be found, the employee should then try a full-face mask.

8.2 Familiarization

Once the proper fitting respirator has been selected, the employee should don the device, adjusting the face piece and tension straps. He/she should wear the mask for as least five minutes before taking it off and putting it on several times, adjusting the straps each time to become familiar with the respirator and adept at setting the proper tension on the straps.

8.3 Fit-Testing Requirements

OSHA requires that respirators be fitted properly and that they be tested for their face piece to face seal. There are currently two methods acceptable for conducting these tests. Qualitative and Quantitative Fit Testing. The Qualitative method is a fast, easily conducted test that can be performed almost anywhere, while the Quantitative method requires the use of bulky test chambers and very expensive electronic equipment. The Qualitative method applies only to negative pressure non-powered air-purifying respirators. Due to numerous field locations in which fit testing must be accomplished, the Qualitative fit test shall be utilized throughout the Remediation Contractor's organization.

Qualitative fit testing is based on the wearer's subjective response to the test agent of chemical of which the two most popular tests are: the odorous vapor test, and the taste test. (See Exhibit 5 procedures). The following represents a brief summary of how to conduct each of these tests.

8.3.1 Odorous Vapor Test

The odorous vapor test relies on the respirator wearer's ability to detect odorous materials, usually isoamyl acetate saturated material around the outside of the respirator. If the wearer is unable to smell the chemical, then a satisfactory fit is assumed to be achieved.

When an air-purifying respirator is tested by this method, it should be equipped with an inorganic vapor cartridge, which removes the test vapor from the air.

Note: This test is solely dependent upon the employee's honest response, there is no involuntary reaction. For that reason, it is the preferred test method.

8.3.2 Taste Test

The taste test relies upon the wearer's ability to detect a chemical substance, usually sodium saccharin, by tasting it inside the respirator. The test performed by placing an enclosure over the respirator wearer's head and shoulders, and spraying the test agent into the enclosure with a nebulizer. If the wearer is unable to taste the chemical, then a satisfactory fit is assumed to be achieved.

Note: This test is totally dependent on the wearer's honest indication of taste. There is no involuntary response and therefore is not preferred as the method of testing. When conducting this type of test, the person being tested must not be allowed to eat, drink, chew gum or tobacco, or smoke.

8.4 Field Test

There are two tests that are used in the field to check the seal of the respirator. These are known as the positive and negative pressure sealing tests. Each of these two tests must be performed every time a respirator is put on, and prior to entering a contaminated area.

Note: Although both the positive and negative pressure tests are considered essential to a good respiratory protection program and should always be used prior to entering an area of exposure, they are recognized solely as a field test and cannot be substituted for the qualitative fit test.

8.4.1 Positive Pressure Test

1. This test only applies to those respirators, which have an exhalation valve, which can be blocked. The exhalation valve may have to be removed for the test.
2. Close or Ablock off@ the exhalation valve.
3. Exhale gently into face pieces.
4. If a slight pressure is built up, with no apparent outward leakage around face pieces to face, seal is assumed to be satisfactory.

8.4.2 Negative Pressure Test

1. Close the inlet opening or hose of the respirator face pieces with the hand(s), tape or the other means.
2. Inhale gently so that the face pieces collapse slightly and hold the breath for ten seconds.
3. If the face piece remains slightly collapsed and no inward leakage occurs, then the face piece to seal is assumed satisfactory.

8.5 Record Keeping of Test Results

A summary of the test results for each employee on whom a qualitative fit test was conducted will be documented on the Respirator Test Summary (See Exhibit 6). This record will then become a part of the employee=s medical record and will be retained for the same time period as the medical records.

9.0 TRAINING

Respirators will not be issued to individuals (including company officials, subcontractors, or visitors) who have not received appropriate training and medical clearance.

9.1 Training Program

The extent and frequency of employee training depends primarily on the nature and extent of the hazard. As a minimum, all employees and supervisory personnel will be trained in basic respirator practices. It must be remembered that respirators are effective only when they are acceptable to the employee and worn properly by him/her. Because proper use depends especially upon the wearer's motivation, it is important that the need for the respirator be explained fully.

The basic respirator-training program must include:

- A discussion of the nature of airborne contaminants against which the employee must be protected and why engineering and/or administrative controls have not been effective in controlling exposure to the point where respirators are not required.
- A discussion of why the respirator, which has been selected for this job, is the proper device for this particular purpose.
- Instruction on the respirator=s limitations, emphasizing such things as oxygen deficiency, toxic contaminants which are immediately dangerous to life or health, and the need for

changing filter cartridges when indicated to do so by testing, or when breathing resistance increases to an uncomfortable level.

- Instructions on how to inspect the respirator and ensure that it is in proper working condition.
- Instructions on how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to wear the respirator comfortably.
- Instructions on the method of fit-testing used and the proper way to conduct positive and negative pressure test each time the respirator is put on. During this instruction, the wearer must be made to understand that the respirator cannot be used when conditions prevent a satisfactory face piece to face seal. If this condition cannot be corrected, the employee cannot be allowed into the area requiring the use of a respirator.
- Instructions in the proper care and maintenance of the respirator.
- A discussion on the value of medical surveillance and air sample exposure monitoring.
- Field training to recognize and cope with any type of emergency while using the respirator.

9.2 Respirator Training Record

Upon completion of the basic respirator training program, the employee will be required to read and sign the Respirator Training Record (See Exhibit 5) attesting to the fact that they have received the basic training program and feel confident in their ability to use the respirator properly. The signed and dated Respiratory Training Record will then become part of the employee's medical records and will be retained for the same period of time as those records.

10.0 CARE AND MAINTENANCE

Personnel involved in respirator maintenance must be thoroughly trained. Substitution of parts from different brands or type of respirators invalidate approval of the device. Repairs and adjustments should never be made beyond the manufacturer's recommendations.

10.1 Cleaning the Respirator

Respirators must be cleaned and disinfected after each day's use when they are assigned to one individual or after each use if they are assigned to more than one person. The following procedures are recommended for cleaning and disinfecting the respirator:

- If required, remove and discard filters or cartridges.
- Wash face piece and breathing tube in detergent and warm water (120^0F) or cleaner/disinfectant solution. Use a soft brush to facilitate removal of dirt. Cleaner/disinfectant solutions are available from respirator manufacturers or it can be made

using a solution of water and household chemicals such as two tablespoons of chlorine bleach to one gallon of water or one teaspoon or tincture of iodine solution is sufficient for disinfecting. Do not use an alcohol-based solution to clean and disinfect a respirator face piece.

- Rinse completely in clean warm water.
- Air-dry in clean air.
- Clean out other parts, as recommended by the manufacturer.
- Inspect the valves, head straps, and other parts - replace with new parts if defective.
- Place face piece in a plastic bag or container for storage in an assigned area.
- Insert new filters or cartridges prior to use, making sure the seals are tight.

10.2 Storing the Respirator

When they are not being used, respirators should be individually sealed in plastic bags and stored at convenient locations in order to protect them against dust, sunlight, extreme temperatures, excessive moisture, or damaging chemicals. They should be stored in such a way that the face piece and exhalation valve are not being distorted.

10.3 Inspecting the Respirators

All respirators should be inspected before and after use, and at least monthly by a competent person to assure that they are in satisfactory working condition. A general inspection checklist should include:

- Tightness of connections
- Conditions of face piece straps, connecting tubes, and cartridge
- Condition of exhalation and inhalation valves: If the side of the exhalation valve gaps even slightly, it must be replaced with a new valve.
- Pliability and flexibility of rubber parts: Deteriorated rubber parts must be replaced, unused rubber parts should be worked, stretched and manipulated, with a massaging action.
- Proper function of regulations and warning devices

Respiratory protection is no better than the condition of the respirator in use, even though it is worn conscientiously. Frequently, random inspections must be conducted by a qualified individual to assure that the respirators are properly selected, fitted, used, cleaned, and maintained.

On the inside of the respirator face piece, the manufacturer is required to affix a stamp indicating the production date of the face piece. Respirator face pieces have a life expectancy of three years, therefore, face pieces should be replaced after every three years of use.

Note: For a detailed respirator checklist, refer to the Respirator Inspection Chart in Exhibit 7.

10.4 Care and Maintenance Records

A written record should be maintained of the Care and Maintenance program within each individual company. Information contained on this record should include inspection reports, replacement parts used, dates of repair, cleaning and type of disinfectant used and the names of persons doing the work. The respirator should be identified by manufacturer, model, and approval number. Records should be retained for a period of five years.

11.0 MEDICAL REQUIREMENTS

Remediation Contractor employees will not be assigned to tasks requiring the use of a respirator unless it has been determined that they are physically able to perform work, and use the respirator.

11.1 Medical Examinations

Employees who are working at or above the Action Level[1] of a toxic substance for thirty (30) days or more per year, or who are using a negative pressure respirator, will be required to undergo a medical evaluation of the following frequency:

- Prior to assignment of a respirator for those employees who will be issued a negative pressure respirator.
- At least annually thereafter.

Each procedure of the medical examination and evaluation will be performed by or under the supervision of a licensed physician and will include, as a minimum, a chest x-ray both posterior and anterior, a medical and work history and special emphasis directed to the pulmonary, cardiovascular, and gastrointestinal systems to determine the presence of any possible respiratory

[1] There is no Action level associated with asbestos exposure; therefore, workers assigned to asbestos work areas will be issued respirators independent of employee exposure levels.

diseases. A pulmonary function test which will include both the maximum amount of air that can be expired from the lungs after full inhalation (FVC) and maximum amount of air forcibly expired in one second after exhalation (FEV10).

The only exception to this requirement, for an initial medical examination, is if the employee or company can provide adequate records/documentation to show that he/she has been examined in accordance with the provision of this program within the past one (1) year period.

11.2 Medical Forms

When conducting the initial medical examination, the standard medical questionnaire must be used. During the annual re-examination, the abbreviated standardized medical questionnaire should be used.

In addition to the standardizing questionnaires, the physician must also be furnished with a copy of the latest OSHA standards governing the type of exposure the employee will be involved in. A description of the employee's duties as they relate to the exposure, the anticipated exposure level, a description of the respiratory protection equipment to be used, and any available information from the previous medical examinations of the employee must also be furnished to the physician.

At the conclusion of the examination, the physician will submit a written opinion to the Remediation Contractor. This will contain the results of the examination, and conditions discovered by the physician that will prohibit the employee from using a respirator and any recommendations from the physician regarding the employee's limitations. It will also contain a statement from the physician that he/she has informed the employee of the results of the examination. A copy of the physician's opinion must be furnished to the employee by the company within thirty (30) days of its receipt by the company.

11.3 Maintenance Records

All records pertaining to the employee's medical examination must be retained for a period of thirty (30) years.

12.0 WORK AREA SURVEILLANCE

As of October 8, 1998, the Respiratory Protection Standard 29 CFR 1910.134, requires the employer to monitor the continued effectiveness and appropriateness of the respirators selected for a particular work area. This includes identification of work area containment(s), the nature of the hazards, concentration at the breathing zone and, if appropriate, biological monitoring. The industrial hygienist who is conducting the air sampling should carefully document any apparent deficiencies in surveillance necessary to the respirator program.

13.0 VOLUNTARY USE OF RESPIRATORS[2]

The Remediation Contractor will periodically perform Negative Exposure Assessments (NEA) in order to document worker exposure and ensure the proper selection of respirators. If the NEA indicates that a specific work practice does not require the use of respirators, then the employees assigned to such tasks will not be issued respirators. However, if employees voluntarily decide to wear respirators, they must participate in the Remediation Contractor Medical Surveillance Program.

14.0 PROGRAM EVALUATION

The program administration should periodically assess the effectiveness of the respiratory protection program during all phases of operation in which respiratory protection is being used. Frequent walk-through inspections during these activities should be conducted to monitor and document supervisor and worker compliance with the requirements of the program. In addition to specific evaluations of the respirator cleaning, inspection, maintenance, desired results of these operations are consistently achieved.

15.0 VIOLATION AND DISCIPLINARY ACTION

Respiratory protection is a crucial part of the company's overall safety program. As such, mandatory compliance with all aspects of this program, by those employees required to use a respirator, is a condition of continuing employment.

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2 As of October 8, 1998, Respiratory Protection Programs must include provisions for voluntary use of respirators.

15.1 Disciplinary Action

When it has come to the attention of a supervisor that an employee has deliberately removed his/her respirator or broken the face piece to the seal while in the contaminated area, the employee will be immediately suspended from work and instructed to leave the job site pending a final disposition. Random spot checks will be conducted to determine the effectiveness of the employee's fit test. Should the check, which will be a positive or negative pressure test conducted under the direction of a supervisor, indicated that the employee's respirator does not have satisfactory seal, the employee will be advised accordingly and instructed to leave the contaminated area. A written citation will be issued to the employee the first time he/she fails a random check. Two such citations on the same job will be sufficient cause for dismissal.

16.0 REPORTING RESPIRATOR PROBLEMS

Occasionally, the company may find a defect in the design or performance of a respirator. The best course to follow is to report these findings to the administrator of the company's respiratory protection program, which in turn, should report to the Remediation Contractor's Safety Officer. The respirator carries with it the approval of the National Institute of Occupational Safety and Health (NIOSH), the Corporate Safety Officer will report the findings to the respirator's manufacturer and to NIOSH.
This will be done by notifying the manufacturer of the defect in a report format and forwarding a copy of the report to NIOSH. The report will include the following:

- The name, address, and telephone number of the Remediation Contractor
- The name of the respirator's manufacturer
- Model number of the respirator
- The name and part number (if possible) of the defective part
- A brief description of the respirator's use when the defect was discovered
- A description of the defect
- A description of the defects adverse effect on the respirator's performance

This report should be addressed to the NIOSH Division of Safety Research, testing and Certification Branch, 944 Chestnut Ridge Road, Morgan Town, West Virginia 26595.

EXHIBIT 1
CLASSIFICATION AND DESCRIPTION OF RESPIRATOR BY MODE OF OPERATION

1.0 ATMOSPHERE-SUPPLYING RESPIRATORS

A respirable atmosphere independent of the ambient air is supplied to the wearer.

Self-Contained Breathing Apparatus (SCBA). A supply of oxygen, or oxygen-generating material is carried by the wearer. Normally equipped with full-face piece, but may be equipped with a quarter-mask face piece, half-mask, helmet, hood or mouthpiece, and nose clamp.

1.1. Closed-Circuit SCBA (Oxygen only, negative pressure or positive pressure)

1.1.1 Compressed or Liquid Oxygen Type

Equipped with a face piece or mouthpiece and nose clamp. High-pressure oxygen from a gas cylinder passes through a high pressure-reducing valve and, in some designs, through a low-pressure admission valve to a breathing bag or container. Liquid oxygen is converted to low pressure gaseous oxygen and delivered to the breathing bag. The wearer inhales from the bag, through a corrugated tube connected to a mouthpiece or face piece and a one-way check valve. Exhaled air passed through check valve and tube into a container of carbon dioxide removing chemical or as the bag deflates sufficiently to actuate an admission valve. A pressure-relief system is provided; and a manual bypass system and saliva trap may be provided depending upon the design.

1.1.2 Compressed or Liquid Oxygen Type

Equipped with a face piece or mouthpiece and nose clamp. Water vapor in the exhaled breath reacts with chemicals in the canister to release oxygen to the breathing bag. The wearer inhales from the bag through a corrugated tube and one-way check valve at the face piece. Exhaled air passes through a second check valve breathing tube assembly into the canister. The oxygen-release rate is governed by the volume of exhaled air. Carbon dioxide in the exhaled breath is removed by the canister fill.

1.2. Open-Circuit SCBA (Compressed air, compressed oxygen, liquid air, liquid oxygen)

A bypass system is provided in case of regulator failure, except on escape-type units.

1.2.1 Demand Type C

Equipped with a face piece or mouthpiece and nose clamp. The demand valve permits oxygen or airflow only during inhalation. Exhaled breath passes to ambient atmosphere through a valve(s) in the face piece.

1.2.2 Pressure-Demand Type D

Equipped with a face piece only. Positive pressure is maintained in the face piece. The apparatus may have provisions for the wearer to select the demand or pressure-demand mode of operation, in which case the demand mode should be used only when donning or removing the apparatus.

1.3. Supplied-Air Respirator

1.3.1 Hose Mask

Equipped with a face piece, breathing tube, rugged safety harness, and a large diameter heavy-duty non-kinking air supply hose. The breathing tube and air-supply hose are securely attached to the harness. The face piece is equipped with an exhalation valve. The harness has provisions for attaching a safety line.

1.3.2 Hose Mask with Blower

Air is supplied by a motor driven or hand operated blower. The wearer can continue to inhale through the hose if the blower fails. Up to 200 feet (91 meters) of hose length is permissible.

1.3.3 Hose Mask without Blower

The wearer provides motivating force to pull air through the hose. The hose inlet is anchored and filled with a funnel or like object covered with a fine mesh screen to prevent entrance of coarse particulate matter. Up to 75 feet (23 meters) of hose length permissible.

1.4 Air-Line Respirator

Respirable air is supplied through a small diameter hose from a compressor or compressed air cylinder(s). The hose is attached to the wearer by a belt or other suitable means and can be detached readily in an emergency. A flow-control valve or orifice is provided to govern the rate of air to the wearer. Exhaled air passes to the ambient atmosphere through a valve(s) or opening(s) in the enclosure (face piece, helmet, hood or suit). Up to 300 feet (91 meters) of hose length is permissible.

1.4.1 Continuous-Flow Class

Equipped with a face piece, hood, helmet, or suit. At least 115 liters (4 cubic feet) of air per minute to light-fitting face pieces and 170 liters (6 cubic feet) of air per minute to loose-fitting helmets, hoods, and suits are required. Air is supplied to a suit through a system of internal tubes to the head, trunk, and extremities through valves located in appropriate parts of then suit.

1.4.2 Demand Type C

Equipped with a face piece only. The demand valve permits the flow of air only during inhalation.

1.4.3 Pressure Demand Type D

Equipped with a face piece only. A positive pressure is maintained in the face piece.

1.4.4 Combination Air-Line Respirators with Auxiliary Self-Contained Air Supply

Include an airline respirator with an auxiliary self-contained air supply. To escape from a hazardous atmosphere in the event the primary air supply fails to operate, the wearer switches to the auxiliary self-contained air supply. Devices approved for both entry into and escape from dangerous atmospheres has a low-pressure warning alarm and contain at least 15-minute self-contained air supply.

1.4.5 Combination Atmosphere-Supply and Air-Purifying Respirators

Provide the wearer with the option of using either of two different modes of operation:

1. An atmosphere-supplying respirator with an auxiliary air purifying attachment which provides protection in the event the air supply fails; or
2. An air-purifying respirator with an auxiliary self-contained air supply which is used when the atmosphere may exceed safe conditions for use of an air-purifying respirator.

2.0 AIR-PURIFYING RESPIRATORS

Ambient air, prior to being inhaled, is passed through a filter, cartridge or canister which removes particles, vapors, gases, or a combination of these contaminants. The breathing action of the wearer operates the non-powered type of respirator. The power type contains a blower - stationary or carried by the wearer - which passes ambient air through an air-purifying component and then supplies purified air to the respirator inlet covering.

The non-powered type is equipped with a face piece or mouthpiece and nose clamp. The powered type is equipped with a face piece, helmet, hood, or suit.

2.1. Vapor – and Gas – Removing Respirator

Equipped with cartridge(s) or canister(s) to remove a single vapor or gas (for example, chlorine gas), a single class of vapors or gases (for example: dust and fume), from air. Filter may be a replaceable part of a permanent part of the respirator. Filter may be the single-use or the reusable type.

2.2. Particulate-Removing Respirators

Equipped with filter(s) to remove a single type of particulate matter (for example: dust), or a combination of two or more types of particulate matter (for example: dust and fume), from air. Filter may be a replaceable part of a permanent part of the respirator. Filter may be the single-use or the reusable type.

2.3. Combination Particulate – and Vapor – and Gas – Removing Respirator

Equipped with cartridge(s) or canister(s) to remove particulate matter, vapors, and gases from air. The filter may be a permanent part, or replacement part of a cartridge or canister.

A. Device procedures negative pressure on respiratory inlet covering during inhalation
B. Device procedures positive pressure on respiratory inlet covering during both inhalation and exhalation.
C. Equipped with a demand valve that is activated on initiation of inhalation and permits the flow of breathing atmosphere to the face piece. On exhalation, pressure in the face piece becomes positive and the demand valve is deactivated.
D. A positive pressure is maintained in the face piece by a spring loaded or balanced regulator and exhalation valve.

EXHIBIT 2
CAPABILITIES OF RESPIRATORS

1.0 ATMOSPHERE-SUPPLYING RESPIRATORS

Atmosphere-supplying respirators provide protection against deficiency and toxic atmospheres. The breathing atmosphere is independent of ambient atmospheric conditions.

1.1. General Limitation

Except for some airline suits, no protection is provided against skin irritation by material such as ammonia and hydrogen chloride, or against sorption of materials such as hydrogen cyanide, tritium, or organic phosphate pesticides through the skin. Face pieces present special problems to individuals required to wear prescriptive lenses (See 9.1). Use of atmosphere-supplying respirators in atmospheres immediately dangerous to life or health is limited to specific devices under specified conditions (See Table 5 and 9.3 and 9.4).

1.2. Self Contained Breathing Apparatus (SCBA)

The wearer carries his/her own breathing atmosphere.

1.2.1 Limitations

The period over which the device will provide protection is limited by the amount of air or oxygen in the apparatus, the ambient atmospheric pressure (service life of open-circuit devices is cut in half by a doubling of the atmospheric pressure), and the type of work being performed. Some SCBA devices have a short service life (less than 15 minutes) and are suitable only for escape (self-rescue) from an irrespirable atmosphere.

Chief limitations of SCBA devices are their weight or bulk, or both, limited service life, and the training required for their maintenance and sale use.

1.3 Closed-Circuit SCBA

The closed-circuit operation conserves oxygen and permits longer service life at reduced weight. The negative pressure type produces a negative pressure in the respiratory -inlet covering during

inhalation, and this may permit leakage of contaminants, whereas the positive pressure type always maintains a positive pressure in the respiratory-inlet covering, and is less apt to permit inward leakage of contaminants.

1.3.1 Open-Circuit SCBA

The demand type produces a negative pressure in the respiratory-inlet covering during inhalation, whereas the pressure-demand type maintains a positive pressure in the respiratory-inlet covering during inhalation, and is less apt to permit inward leakage of contaminants.

1.3.2 Supplied-Air Respirators

The respirable air supply is not limited to the quantity the individual can carry, and the devices are lightweight and simple.

1.2.1.1 Limitations

Limited to use in atmospheres from which the wearer can escape unharmed without the aid of the respirator. The wearer is restricted in movement by the hose and must return to a respirable atmosphere by re-tracing his/her route of entry. The hose is subject to being severed or pinched off.

1.3. Hose Mask

The hose inlet or blower must be located and secured in a respirable atmosphere.

1.3.1 Hose Mask with Blower

If the blower fails, the unit still provides protection, although a negative pressure exists in the face piece during inhalation.

1.3.2 Hose Mask without Blower

Maximum hose length may restrict application of device.

1.4 Air-Line Respirator (Continuous Flow, Demand, and Pressure-Demand Types)

The demand type produces a negative pressure in the face piece on inhalation, whereas continuous-flow and pressure-demand types maintain a positive pressure in the respiratory-inlet covering and are less apt to permit inward leakage of contaminants. Airline suits may protect against atmospheres that irritate the skin or that may be absorbed through unbroken skin.

1.4.1 Limitations

Airline respirators provide no protection if the air supply fails. Some contaminants, such as tritium, may penetrate the material of an airline suit and limit its effectiveness. Other contaminants, such as fluorine, may react chemically with the material on an airline suit and damage it.

1.4.2 Combination Air-Line Respirators with Auxiliary SC Air Supply

The advantages and disadvantaged, expresses above, of the mode of operation being used will govern. The mode with greater limitations (air-purifying mode) will mainly determine the overall capabilities and limitation of the respirator, since the wearer may for some reason fail to change the mode of operation even though conditions would require such a change.

2.0 AIR-PURIFYING RESPIRATORS

2.1 General Limitations

Air purifying respirators do not protect against oxygen-deficient atmospheres, or against skin irritations by, or sorption through the skin, of airborne contaminants. The maximum contaminant concentration against which an air-purifying respirator will protect is determined by the design efficiency and capacity of the cartridge, canister, or filter, and face piece-to-face seal on the user. For gases and vapors, the maximum concentration for which the air-purifying element is designated is specified by the manufacturer or is listed on labels of cartridges and canisters.

Non-powered air purifying will not provide the maximum design protection specified unless the face piece or mouth piece/nose clamp is carefully fitted to the wearer's face to prevent inward leakage (See 7.4). The time period over which protection is provided is dependent on canister,

cartridge, or filter type; concentration of contaminant; humidity levels in the ambient atmosphere; and the wearer's respiratory rate.

The proper type of canister, cartridge, or filter must be selected for the particular atmosphere and conditions. Non-powered air-purifying respirators may cause discomfort, due to noticeable resistance to inhalation. This problem is minimized in powered respirators. Respirators face piece present special problems to individual required to wear prescription lenses (See 9.1). These devices do have the advantage of being small, light, and simple in operation. Use of air-purifying respirators in atmosphere immediately dangerous to life or health is limited to specific devices under specific conditions (See Table 5 and 9.3 and 9.4).

2.1 Vapor and Gas-Removing Respirators

2.1.1 Limitations

No protection is provided against particulate contaminants. A rise in canister or cartridge temperature indicates that a gas vapor is being removed from the inspired air. An uncomfortably high temperature indicates a high concentration of gas or vapor and requires and immediate return to fresh air.

Use should be avoided in atmosphere where the contaminant(s) lacks sufficient warning properties (that is: odor, taste, or irritation at a concentration in air at or above the (permissible exposure limit). Vapor-and-gas-removing respirators are not approved for contaminants that lack adequate warning properties.

Not for use in atmospheres immediately dangerous to life or health unless the device is a powered-type respirator with escape provisions (See Table 5).

- Full Face Piece Respirator provides protection against eye irritation, in addition to respiratory protection.
- Quarter-mask and Half-mask Face Piece Respirator provides a fabric covering (face let) available from some manufacturers shall not be used.
- Mouthpiece Respirator shall be used only for escape applications. Mouth breathing detection of contaminant by odor. Nose clamps must be securely in place to prevent nasal breathing.
- Limitations include no protection is provided against particulate contaminants. A rise in canister or cartridge temperature indicates that a gas or vapor is being removed from the inspired air.

3.0 PARTICULATE-REMOVING RESPIRATORS

3.1 Limitations

Protection against non-volatile particles only. No protection against gases and vapors. Not for use in atmosphere immediately dangerous to life or health unless the device is a powered-type respirator with escape provisions (See Table 5).

3.1.1 Full Face Piece Respirator

Provide protection against eye irritation, in addition to respiratory protection.

3.1.2 Quarter-Mask and Half-Mask Face Piece Respirator

A fabric covering (facelet) available from some manufacturers shall not be used unless approved for use with respirator.

3.1.3 Mouth Piece Respirator

Shall be used only for escape application. Mouth breathing prevents detection of contaminant by odor. Nose clamp must be securely in place to prevent nasal breathing.

3.2 Combination Particulate-and-Vapor-and-Gas Removing Respirators

The advantages and disadvantages of the component sections of the combinations respirator as described above apply.

EXHIBIT *3*
SELECTION CHART FOR ROUTINE RESPIRATOR USE

Airborne Concentration of Contaminant	**Required Respirator**
< Permissible Exposure Limit (PEL) over 8-hour Time Weighted Average (TWA)[3]	Respirators not required
≥ PEL but < 10 x PEL	Half-mask air-purifying respirator other than a disposable respirator, equipped with appropriate filter cartridge and/or canister.
≥ 10 x PEL but < 50 x PEL	Full-face piece air-purifying respirator other than a disposable respirator, equipped with appropriate filter cartridge and/or canister.
≥ 50 x PEL but < 100 x PEL	Full-face piece powered air-purifying respirator other than a disposable respirator, equipped with appropriate filter cartridge and/or canister. or Full-face piece supplied-air respirator operated in the continuous flow mode.
≥ 100 x PEL but < 1,000 x PEL	Full-face piece supplied-air respirator operated in the pressure demand mode.
≥ 1,000 x PEL or any unknown concentration	Full-face piece supplied-air respirator operated in the pressure demand mode equipped with a full-face piece self-contained supplied-air escape unit.

3 If at or above the Action Level (normally set at one-half the PEL), medical and employee exposure monitoring is required, as well as the issuance of proper respiratory protection.

EXHIBIT 4
PROCEDURES FOR CONDUCTING A QUALITATIVE FIT-TEST

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures -- General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable face pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
   (a) Position of the mask on the nose
   (b) Room for eye protection
   (c) Room to talk
   (d) Position of mask on face and cheeks
7. The following criteria shall be used to help determine the adequacy of the respirator fit:
   (a) Chin properly placed;
   (b) Adequate strap tension, not overly tightened;
   (c) Fit across nose bridge;
   (d) Respirator of proper size to span distance from nose to chin;
   (e) Tendency of respirator to slip;
   (f) Self-observation in mirror to evaluate fit and respirator position.
8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns, which cross the respirator-sealing surface.

10. Any type of apparel, which interferes with a satisfactory fit, shall be altered or removed.

11. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

12. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

13. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

14. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use, which could interfere with respirator fit.

15. Test Exercises. (a) The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:

    (1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

    (2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

    (3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

    (4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

    (5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist. (8) Normal breathing. Same as exercise (1).

(a) Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

Qualitative Fit Test (QLFT) Protocols

1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1-liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, and then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

(6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold-screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b) (5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste

response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this exhibit.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a \3/4\ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold-screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this exhibit.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

5. Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

(a) General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

(2) Only stannic chloride smoke tubes shall be used for this protocol.

(3) No form of test enclosure or hood for the test subject shall be used.

(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

(c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in section I.A. 14. of this exhibit shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

B. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.

(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

(b) Procedural Requirements.

(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

(8) Calculation of fit factors.

a. The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

b. The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

c. The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

d. ***(A)*** Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

(B) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$PV_1 = ff_1/Conc._{out}$

$PV_2 = ff_2/Conc._{out}$

$PV_3 = ff_3/Conc._{out}$

$PV_{Avg} = (PV_1 + PV_2 + PV_3)/3$

$Off = Conc._{out}/ PV_{Avg}$

Where PV_1, PV_2, PV_3, etc. are the penetration values for exercises 1, 2, 3;

$Conc._{out}$ is the ambient (outside face mask) air concentration;

Where ff_1, ff_2, ff_3, etc. are the fit factors for exercises 1, 2, 3; and

Off is the overall fit factor

(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

2. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol.

3. The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount ™) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

   (a) Portacount Fit Test Requirements.

      (1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

      (2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

      (3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.

      (4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

      (5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

      (6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this exhibit

      (7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

   (b) Portacount Test Instrument.

(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4. The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, airflow out of the respirator is equal to airflow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage airflow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Dynatech Nevada also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

(1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

(2) The CNP system defaults selected for test pressure shall be set at -- 15 mm of water (-0.58 inches of water) and the

modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(**Note:** CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

(3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

(4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

(5) The test subject shall be trained to hold his or her breath for at least 20 seconds.

(6) The test subject shall don the test respirator without any assistance from the individual who conducts the CNP fit test.

(7) The QNFT protocol shall be followed according to section I.C.1. of this exhibit with an exception for the CNP test exercises.

(b) CNP Test Exercises.

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the

moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

(c) CNP Test Instrument.

(1) The test instrument shall have an effective audio warning device when the test subject fails to hold his or her breath during the test. The test shall be terminated whenever the test subject failed to hold his or her breath. The test subject may be refitted and retested.

(2) A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

Part II. New Fit Test Protocols

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking

proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Exhibit.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.

RECORD KEEPING

The Respirator Test Summary, shown in Exhibit 6, must be completed after each fit-test.

EXHIBIT 5
RESPIRATOR FIT-TEST AND TRAINING RECORD

Employee=s Name: _____ Social Security No.: _____-_____-
Project Name: _____ Job Number:
RESPIRATOR FIT-TEST SUMMARY (*Must be conducted for each negative pressure respirator used*)
Fit-Test Date: _____ Person Conducting Fit-Test:
Respirator Selected:
Manufacturer: _____ Model:
Respirator Size: _____ NIOSH Approval No.:
Was Rainbow Passage Used: ___ Yes ___ No Was Face piece-to-face Seal Obtained: ___ Yes __ No
Signature of person conducting Fit-Test: _____

RESPIRATOR TRAINING RECORD

Your signature on the respirator Training Record will attest to your having received and understood the following respirator training information which both OSHA and the Remediation Contractor require as part of their Respiratory Protection Program.

The required respirator training consists of the following:

- ☐ An explanation of the problems involved in misusing or inter-changing parts of the respirator.
- ☐ A discussion of why engineering controls could not prevent the use of respiratory protection.
- ☐ How and why this make and model was chosen for this specific project.
- ☐ The limitations of this make and model was chosen for this specific project.
- ☐ How to put on this respirator and properly adjust the face piece and tension straps.
- ☐ How to wear this respirator properly.
- ☐ What the essential points of the care and maintenance of this respirator are.
- ☐ How to recognize and handle emergencies which may occur while using this respirator.
- ☐ How to properly inspect, clean, and disinfect this respirator.
- ☐ How to properly use an Air Purifying Respirator.
- ☐ When a Type-C Supplied-air respirator is required.
- ☐ The purpose of medical evaluation.
- ☐ How the Remediation Contractor conducts a proper respirator fit-test.
- ☐ That a Powered Air Purifying Respirator (PAPR) is available to you upon request, as long as it meets the protection factor for the hazard involved.

Employee=s Signature: _____ Date:

EXHIBIT 6
QUALITATIVE RESPIRATOR FIT TESTING

Date:
Employee Name: _____ (Last, First, Middle Intl.)
Age: _____ Sex:
Years Experience: _____ Frequency: _____ **See Key
Mask Now Using: _____ Usual Conditions: _____ **See Key
Mask Selected: _____ (i.e. MSA, Half Mask, Medium)
Qualitative Tests: (PP) ____ (NP) _____ (IA) _____ (IS)
(1) = Passed (2) = Failed (3) = Did Not Run
IAA Sensitivity Test: _____ (Pass) or (Fail)
Smoke Sensitivity Test: _____ (Pass) or (Fail)
Respirator Selection: 1st Choice: _____ (Pass) or (Fail)
2nd Choice: _____ (Pass) or (Fail)
3rd Choice: _____ (Pass) or (Fail)
Final Selection: _____ (Pass) or (Fail)
(Manufacturer/Size)
Test Instructor: _____ Employee Signature:
Comments: Facial Conditions:

() Wrinkles
() Broken Nose
() Deep Nostrils
() Narrow Face
() Other
() Wide-Bridge
() Shallow-Bridge
() Small Face
() Wide Face

Frequency:

How many times used during a week:

(1) Less than 1/Week
(2) 2-5 Times/Week
(3) 5-10 Times/Week
(4) 1-4 Times/Day

Usual Conditions:

Qualitative Tests:
(1) Beard/Heavy
(2) Beard/Light
(3) Scars
(4) Wrinkles
(5) Glasses
(6) Several Days Beard Growth

PP - Positive Pressure
NP - Negative Pressure
IA - Isoamyl Acetate
IS - Irritant Smoke

EXHIBIT 7

RESPIRATOR INSPECTION CHART

Item	Half Face APR	Full Face APR	PAPR	Type C	SCBA
FACE PIECE	X	X	X	X	X
Dirt or debris	X	X	X	X	X
Cracks, tears or holes	X	X	X	X	X
Distortion	X	X	X	X	X
Cracked or scratched lens		X	X	X	X
Looseness of parts					
HEAD STRAPS	X	X	X	X	X
Break or tears	X	X	X	X	X
Loss of elasticity	X	X	X	X	X
Broken or malfunctioning buckles					
VALVES	X	X	X	X	X
Dirt or dust	X	X	X	X	X
Detergent residue	X	X	X	X	X
Distortion	X	X	X	X	X
Missing Pieces	X	X	X	X	X
Fit of valve set					
FILTER/CARTRIDGES	X	X	X	X	X
Proper one for intended use	X	X	X	X	X
Approval designation	X	X	X	X	X
Missing or worn gasket	X	X	X	X	X
Worn threads on filter	X	X	X	X	X
Worn threads on face piece	X	X	X		X
Cracks or dents	X	X	X		X
Missing or loose hose clamps					

RESPIRATORY PROTECTION PROGRAM

Item	Half Face APR	Full Face APR	PAPR	Type C	SCBA
COMPRESSORS				X	
Air Quality				X	
Breaks or kinks in supply hose				X	
Supply hose fittings				X	
Connections				X	
Regulator set properly and working				X	
Valves working correctly				X	
Carbon monoxide alarms				X	
High Temperature alarm					
Air-purifying elements					
TANKS					X
Regulator					X
Valves					X
Reserves air system					X
Harness					
PUMPS			X		
Motors			X		
Charging units			X		
Hoses			X		
Batteries			X		
Test gauges			X		
Power cords			X		
Belt holder					

ATTACHMENT 12

REPORT OF ACCIDENT/INCIDENT

NAME OF AFFECTED EMPLOYEE:_____DATE_____

EXACT LOCATION:_____

CONTRACTOR:_____SUPERVISOR:_____

INJURY DATE:_____TIME:_____DATE REPORTED:_____
ACCIDENT LOCATION:_____
DATE DIS. BEGAN:_____

INJURY AND BODY PART AFFECTED:_____

SUPERVISOR / SAFETY COORDINATOR:
- REVIEW, SIGN AND RETAIN FOR RECORDS ON SITE
- COMPLETE WITHIN 48 HOURS

SAFETY EQUIPMENT: □WORN □NOT WORN □NOT APPLICABLE

DESCRIBE OCCURRENCE (HOW, WHAT, **CAUSE** FACTORS; *see attached page*):

_____
_____
_____
_____

Attachment 12
Report of Accident/Incident

EXTENT OF DAMAGE TO EQUIPMENT AND / OR FACILITIES

DEFICIENCIES NOTED (EQUIPMENT / PROCEDURES)

CORRECTIVE ACTION TAKEN TO PREVENT RE-OCCURRENCE (FWR. RTE OR MEMO)

SUPERVISOR / SAFETY COORDINATOR SIGNATURE: _____ DATE: _____

PRINT NAME: _____

PROJECT MANAGER SIGNATURE: _____ DATE: _____

PRINT NAME: _____

Accident Analysis Form

Instructions:

To Determine the **Accident Cause**:

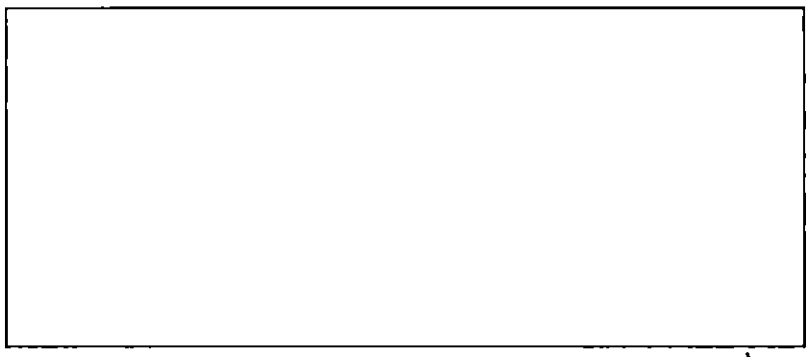
1. Determine if the accident circumstances are in the areas of ***People, Equipment, Environment, or Management.***
2. If there are circumstances in a particular section, ask a series of "why ?" questions to determine the reasons for every set of circumstances.
3. When you have run out of "why?" questions, analyze the result. Eliminate any unlikely causes or circumstances that you *cannot control*. Identify the accident cause.
4. Determine what management system needs to be in place to assure that the accident does not happen again.

People

O Lack of procedures
O Procedures not followed
O Procedures not known or understood
O Task too difficult to perform
O PPE not used or not available
O People not trained
O Training inadequate
O Distraction, Emotions, or Fatigue

Equipment

O Equipment not maintained
O Wrong equipment used
O Poor equipment design
O Correct equipment not available



Environment

O Location of employee
O Temperature extremes
O Poor lighting
O Poor housekeeping
O Inadequate ventilation
O Excessive vibration
O Excessive noise
O Condition of work surface

Management

O No management system in place to control hazard
O Supervision did not detect unsafe conditions or behaviors
O Supervision did not take action to correct unsafe conditions or behaviors
O Lack of supervisor training
O Lack of accountability for safety

Attachment 13
Contractor's Safety Program Evaluation Form

Attachment 13
CONTRACTOR'S SAFETY PROGRAM EVALUATION FORM

Contractor Name:_____ Date:_____

Job Location: _____

Supervisor / Foreman: / PM _____

	Good	Needs Improvement	Comments
□Safety Coordinator	□	□	_____
□Competent Person	□	□	_____
□Barrier / Perimeter Protection	□	□	_____
□Housekeeping	□	□	_____
□OSHA LOG / First Aid	□	□	_____
□Accident Investigation	□	□	_____
□Safety Inspections	□	□	_____
□Safety Training	□	□	_____
□Emergency Evacuation	□	□	_____
□Fall Protection	□	□	_____
□Traffic Safety	□	□	_____
□Hearing Conservation	□	□	_____
□Dust monitoring	□	□	_____
□PPE	□	□	_____
□Medical Evaluations	□	□	_____
□LOTO	□	□	_____
□Confined Space Program	□	□	_____

Attachment 14
Lockout-Tagout

Attachment 14
Lockout-Tagout Procedures

Controls that are to be deactivated during the course of work on energized or de-energized equipment or circuits shall be tagged.

Equipment or circuits that are de-energized shall be rendered inoperative and shall have tags attached at all points where such equipment or circuits can be energized.

Tags shall be placed to identify plainly the equipment or circuits being worked on.

The isolating devices locked and tagged must include all of the devices that control energy, must be singularly used and must not be used for any other purpose.

Locks, hasps and tags must be able to withstand any kind of adverse environment in which they may be used. Tags which are to be located in adverse conditions must not deteriorate making the message illegible.

Lockout requirements are not met by removal of fuses.

Locks and tags are not to be removed by any person other than the individual who applied the locks.

No employee shall rely on another employee's lock and tag.

A Lockout/Tagout Log is to be completed before beginning any work, in accordance with Con Edison procedures. The log shall include the following information:

- Date & time of installation and removal of locks and tags;
- Name of the employee who applied the lock and tag;
- Name of the employee's employer;
- Machine or apparatus being disconnected and locked out;
- Purpose for locking and tagging system(s);
- Lock number;
- Authorization to proceed with work duties.

Notify all project employees that a lockout/tagout system is going to be used and the reason for

it. The on-site health representative shall know the type and magnitude of energy connected to the machine or equipment and understand the hazards. If the machine or equipment is operating, shut it down by normal stopping procedures (depress stop button, open toggle switch, etc.). Operate all switches, valves, or other energy isolating devices so that the equipment is totally isolated from its energy sources. Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding, disconnecting, etc. Place a lock on each isolating device. Only authorized Con Edison employees may attach the locks. The locks must hold the energy isolating devices in a "safe" or "off" position. Attach "Danger - Do Not Operate" tags to each lock. On the tag, write the name of employee, employer, and date of attachment.

If more than one individual is required to lockout and tag the equipment, each person must place a separate lock and tag on each energy-isolating device. When an energy-isolating device cannot accept multiple locks or tags, a multiple lock hasp must be used. Individual locks are removed as each person no longer needs to maintain lockout protection.

NO EMPLOYEE MAY REMOVE THE LOCK OF ANOTHER EMPLOYEE

After verifying that no personnel are exposed, and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate. The system is now properly locked out. CAUTION: Return operating control(s) to "neutral" or "off" position after the test. Implement a tagout system, if a lock cannot be utilized. The tag is to be attached so it will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited. Employees are to be trained in the following limitations of the tagout system:

- Tags are warning devices and do not provide the physical restraint a lock does;
- Tags are not to be removed without authorization of the authorized person responsible for them;
- Tags must be legible, understandable and made of a material which will withstand anticipated environmental conditions; and
- Tags are to be securely attached so that they cannot be inadvertently or accidentally detached during use.
- Where a tag cannot be attached directly to the energy-isolating device, the tag is to be located as close as safely possible to the device in a position immediately obvious to anyone attempting to operate the device.

No employee may remove the lock and tag of another employee. The only exception to this is if an employee has forgotten to remove a lock and is not available to do so. The designated Con Edison lockout/tagout coordinator is the only person who may remove a lock or tag and then only after it is verified that:

- It is safe to restore the energy to the machine or equipment;
- The authorized employee who applied the device is not at the facility;
- All reasonable efforts are made to contact the authorized employee;
- The authorized employee knows his or her lock and tag was removed before he she resumes work at that facility.

Attachment 15
Hearing Conservation

NOISE CONTROL PLAN

1.0 SCOPE AND APPLICATION.

All Contractors and subcontractors shall ensure protection of its employees to occupational noise in accordance with the OSHA Occupational Noise Exposure Standard in the Construction Industry (29 CFR 1926.52). Protection against the effects of noise exposure shall be provided when the sound levels exceed the OSHA permissible exposure limits shown in Table 1 when measured on the A-scale of a standard sound level meter at slow response. When employees are subjected to sound levels exceeding those listed in Table 1, feasible administrative or engineering controls shall be utilized.

If such controls fail to reduce sound levels within the levels of Table 1, personal protective equipment, shall be provided and used to reduce sound levels within the levels of the table. The selected hearing protection devices will reduce the noise levels in accordance with the United States Environmental Protection Agency Noise Reduction Rating (USEPA NRR). If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous. In all cases where the sound levels exceed the values shown herein, a continuing, effective hearing conservation program shall be administered.

2.0 PERMISSIBLE EXPOSURE LIMITS

TABLE 1

PERMISSIBLE NOISE EXPOSURES

Duration in Hours Per Day	**Sound Level dbA Slow Response**
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
1/4 or less	115

Impulse or Impact Noise	140 peak sound pressure level

When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. Exposure to different levels for various periods of time shall be computed according to the formula below.

$F_{(e)}=(T_{(1)}/L_{(1)})+(T_{(2)}/L_{(2)})+ \ldots + (T_{(n)}/L_{(n)})$ where:

$F_{(e)}$= The equivalent noise exposure factor.

T = The period of noise exposure at any essentially constant level.

L = The duration of the permissible noise exposure at the constant level (from Table 1).

If the value of $F_{(e)}$ exceeds unity (1) the exposure exceeds permissible levels.

A sample computation showing an application of the formula is as follows. An employee is exposed at these levels for these periods:

110 dbA 1/4 hour.

100 dbA 1/2 hour.

90 dbA 1 1/2 hours.

$F_{(e)}=(T_{(1)}/L_{(1)})+(T_{(2)}/L_{(2)})+ \ldots + (T_{(n)}/L_{(n)})$

$F_{(e)} = (0.25/0.5) + (0.5/2) + (1.5/8)$

$F_{(e)} = 0.5 + 0.25 + 0.1875$

$F_{(e)} = 0.9375$

Since the value of $F_{(e)}$ is less than 1, the total exposure did not exceed permissible limits.

3.0 NOISE MONITORING

3.1 Purpose

The 8-hour permissible exposure limit in the OSHA Occupational Noise Standard for the Construction Industry is 90 dbA. In order to determine if exposures are at or above this level, it may be necessary to measure or monitor the actual noise levels in the workplace and to estimate the noise exposure or "dose" received by employees during the workday.

Noise monitoring or measuring must be conducted only when exposures are at or above 90 dbA. Factors, which suggest that noise exposures in the workplace may be at this level, include employee complaints about the loudness of noise; indications that employees are losing their hearing, or noisy conditions that make normal conversation in the area difficult.

3.2 Noise Measurement

There are two different instruments to measure noise exposures: the sound level meter and the dosimeter. A sound level meter is a device that measures the intensity of sound at a given moment. Since sound level meters provide a measure of sound intensity at only one point in time, it is generally necessary to take a number of measurements at different times during the day to estimate noise exposure over a workday. If noise levels fluctuate, the amount of time noise remains at each of the various measured levels must be determined.

To estimate employee noise exposures with a sound level meter it is also generally necessary to take several measurements at different locations within the workplace. After appropriate sound level meter readings are obtained, a map of the sound levels within different areas of the workplace will be developed. From the sound level map coupled with information on employee locations throughout the day, an estimate of individual exposure levels can be developed. This measurement method is referred to as area noise monitoring.

A dosimeter is like a sound level meter except that it stores sound level measurements and integrates these measurements over time, providing an average noise exposure reading for a given period of time, such as an 8-hour workday. With a dosimeter, a microphone is attached to the employee's clothing and the exposure measurement is simply read at the end of the desired time period. A reader may be used to read-out the dosimeter's measurements. Since the

dosimeter is worn by the employee, it measures noise levels in those locations in which the employee travels. A sound level meter can also be positioned within the immediate vicinity of the exposed worker to obtain an individual exposure estimate. Such procedures are referred to as personal noise monitoring.

Area monitoring provides better estimates to noise exposure when the noise levels are relatively constant and employees are not mobile. In workplaces where employees move about in different areas or where the noise intensity tends to fluctuate over time, noise exposure is generally more accurately estimated by the personal monitoring approach. For the building demolition activities, personal monitoring with dosimeters would provide more accurate sound level exposure data.

For personal monitoring with a dosimeter, the microphone is located on the shoulder and remains in that position for the entire workday. If a sound level meter is used, the microphone is stationed near the employee's head, and the instrument is usually held by an individual who follows the employee as he or she moves about. Therefore, using a sound level meter to measure occupational noise exposure on a demolition site would tend to be more difficult to implement.

Manufacturer's instructions, contained in dosimeter and sound level meter operating manuals, should be followed for calibration and maintenance. To ensure accurate results, it is considered good professional practice to calibrate instruments before and after each use.

3.3 Monitoring Frequency

Monitoring should be repeated when there are significant changes in machinery, tools or demolition processes that may result in increased noise levels. Re-monitoring must be conducted to determine whether additional employees may be at risk to elevated noise exposure levels. The OSHA construction standard for occupational noise exposure does not stipulate a monitoring schedule, however, Contractors will re-monitor periodically once every year.

Appendix C
Quality Assurance Project Plan (QAPP)

QUALITY ASSURANCE PROJECT PLAN

For the

Former Cibro Petroleum Terminal Site
5 Washington Avenue
Island Park, Nassau County, New York 11558

BCP Site No. C130153, BCA Index No. W1-1075-05-09

Submitted to
New York State Department of Environmental Conservation.
Region 1, Stony Brook, New York

Prepared for
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AUGUST 2012

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, planned activities, and specific quality assurance/quality control (QA/QC) procedures for the Former Cibro Brothers Terminal Site located at 5 Washington Avenue, Island Park, New York (BCP Site No. C130153, BCA Index No. W1-1075-05-09). Task-specific addenda to this QAPP will be provided for future investigations or remediation elements, as appropriate.

The QAPP describes specific protocols for field sampling, sampling handling and storage, chain-of-custody, laboratory analysis, and data handling and management. Preparation of the Plan was based on United States Environmental Protection Agency (USEPA) QAPP guidance documents, including:

- *USEPA Requirements for Quality Assurance Project Plans (EPA QA/R-5, March 2001), and*
- *Guidance for Quality Assurance Project Plans (EPA QA/G-5, December 2002).*

The data generated from the analysis of samples will be used to determine the nature and extent of contamination. A list of the potential parameters to be analyzed, including quantitation limits (QLs), and data quality levels (DQLs), is shown in Tables 1A through 1D.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

TRC Engineers, Inc. (TRC) Project Manager – Ms. Jennifer Miranda, will coordinate and manage the sampling and analysis program, data reduction, QA/QC, data validation, analysis, and reporting.

The TRC Project QA Officer will be Ms. Elizabeth Denly. Ms. Elizabeth Denly, TRC's QA Chemist, will insure that the QAPP is implemented and will oversee laboratory data management. Ms. Denly will provide oversight and technical support for the sampling and analytical procedures. Ms. Denly has the broad authority to approve or disapprove project plans, specific analyses, and final reports. The TRC Project QA Officer is independent from the data generation activities. In general, the QA Officer will be responsible for reviewing and advising on all QA/QC aspects of this program.

Test America Laboratories of Edison, New Jersey will provide analyses of all soil, sediment, groundwater and soil gas samples. Test America is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. The laboratory will communicate directly with TRC regarding the analytical results and reporting. Test America will be responsible for providing all labels, sample jars, field blank water, trip blanks, shipping coolers, and laboratory documentation.

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

Investigative and remedial analytical data will be provided by the laboratory using the New York State Analytical Services Protocol (ASP) Category B deliverable format. Analytical data generated only for the purpose of waste classification and off-site disposal will be submitted in accordance with New York State ASP Category A deliverable format requirements.

All analytical measurements will be made so that the results are representative of the media sampled (soil, groundwater, sediment, and soil gas) and the conditions measured. Data will be reported in consistent dry weight units for solid samples [i.e., micrograms per kilogram (µg/kg) and/or milligrams per kilogram (mg/kg)], micrograms per liter (µg/L) or milligrams per kilogram (mg/L) for aqueous samples, and in micrograms per cubic meter (µg/m^3) and ppbV for soil gas samples. Table 2 presents the proposed samples, sampling and analytical parameters, analytical methods, sample preservation requirements and containers for the investigation and remediation.

Quantitation Limits (QLs) are laboratory-specific and reflect those values achievable by the laboratory performing the analyses (i.e., laboratory reporting limit). Data Quality Levels (DQLs) are those reporting limits required to meet the objectives of the program (i.e., program action levels, cleanup standards, etc.). Data Quality Objectives (DQOs) define the quality of data and documentation required to support decisions made in the various phases of the data collection activities. The DQOs are dependent on the end uses of the data to be collected and are also expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

The analytical methods to be used at this site provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial alternatives and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies are capable of achieving the DQOs, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, and completeness.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet DQOs. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this QAPP.

Tables 3A through 3C present precision and accuracy requirements for each parameter and matrix to be analyzed. For quantitation limits for parameters associated with soil and sediment samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits listed in 6 NYCRR Part 375: Table 375-6.8(b):Restricted Use Soil Cleanup Objectives (Restricted-Residential).

For quantitation limits for parameters associated with groundwater samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits for groundwater in the Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS). In certain instances, if the TOGS criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit.

For quantitation limits for VOCs associated with soil gas samples, the laboratory will be required to report the lowest possible quantitation limits. There are currently no soil gas criteria which need to be achieved, with respect to identified contaminants of concern.

The QA objectives are defined as follows:

- ***Accuracy*** is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

  Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements, and through the collection of equipment blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

  The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards," materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in matrix spikes (MSs), matrix spike duplicates (MSDs) and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds. Tables 3A through 3C summarize the laboratory accuracy requirements.

- ***Precision*** is the agreement among a set of replicate measurements without consideration of the "true" or accurate value (i.e., variability between measurements of the same material for the same analyte). Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

  Precision in the field is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). With the exception of samples collected for disposal characterization, field duplicates will be collected at a frequency of **one per twenty** investigative samples per matrix per analytical parameter. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability. Field duplicate RPDs must be ≤50 for soil and sediment samples and ≤30 for aqueous samples. These criteria apply only if the sample and/or duplicate results are >5x the quantitation limit; if both results are ≤5x the quantitation limit, the criterion will be doubled. Due to the uncertainty of available representative soil gas volume, field duplicates will not be collected for this matrix.

  Precision in the laboratory is assessed through the calculation of RPD for duplicate samples. For organic soil and water analyses, laboratory precision will be assessed through the analysis of MS/MSD samples and field duplicates. MS/MSD samples or laboratory duplicates will be performed at a frequency of **one per twenty** investigative samples per matrix per parameter. Tables 3A through 3C summarize the laboratory precision requirements.

- ***Completeness*** is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

  Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent.

  Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent.

- ***Representativeness*** is a qualitative parameter which expresses the degree to which data accurately and precisely represents either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data. In addition, field duplicate samples will provide an additional measure of representativeness at a given location.

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plan and QAPP are followed and that proper sampling, sample handling, and sample preservation techniques are used.

Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample holding times.

- ***Comparability*** expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plan and QAPP are followed and that proper sampling techniques are used. Maximization of comparability with previous data sets is expected because the sampling design and field protocols are consistent with those previously used. Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts.

Table 1A Soil/Sediment Sampling Chemical Parameters, Quantitation Limits and Data Quality Levels		
Parameter	**QL**	**DQL[1]**
Volatile Organic Compounds (µg/kg)		
1,1,1,2-Tetrachloroethane	1.0	NC
1,1,1-Trichloroethane	1.0	100,000
1,1,2,2-Tetrachloroethane	1.0	NC
1,1,2-Trichloroethane	1.0	NC
1,1,2-Trichlorotrifluoroethane	1.0	NC
1,1-Dichloroethane	1.0	26,000
1,1-Dichloroethene	1.0	100,000
1,1-Dichloropropene	1.0	NC
1,2,3-Trichlorobenzene	1.0	NC
1,2,3-Trichloropropane	1.0	NC
1,2,4-Trichlorobenzene	1.0	NC
1,2,4-Trimethylbenzene	1.0	52,000
1,2-Dibromo-3-chloropropane	1.0	NC
1,2-Dibromoethane	1.0	NC
1,2-Dichlorobenzene	1.0	100,000
1,2-Dichloroethane	1.0	3100
1,2-Dichloropropane	1.0	NC
1,3,5-Trimethylbenzene	1.0	52,000
1,3-Dichlorobenzene	1.0	49,000
1,3-Dichloropropane	1.0	NC
1,4-Dichlorobenzene	1.0	13,000
1,4-Dioxane	50	13,000
2,2-Dichloropropane	1.0	NC
2-Butanone	10	100,000
2-Chloroethylvinylether	1.0	NC
2-Chlorotoluene	1.0	NC
2-Hexanone	10	NC
4-Chlorotoluene	1.0	NC
4-Isopropyltoluene	1.0	NC
4-Methyl-2-pentanone	10	NC
Acetone	10	100,000
Acrylonitrile	50	NC
Benzene*	1.0	4800
Bromobenzene	1.0	NC
Bromochloromethane	1.0	NC
Bromodichloromethane	1.0	NC

Table 1A
Soil/Sediment Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Bromoform	1.0	NC
Bromomethane	1.0	NC
c-1,2-Dichloroethene	1.0	100,000
c-1,3-Dichloropropene	1.0	NC
Carbon disulfide	1.0	NC
Carbon Tetrachloride	1.0	2400
Chlorobenzene	1.0	100,000
Chloroethane	1.0	NC
Chloroform	1.0	49,000
Chloromethane	1.0	NC
Cyclohexane	1.0	NC
Dibromochloromethane	1.0	NC
Dibromomethane	1.0	NC
Dichlorodifluoromethane	1.0	NC
Ethylbenzene*	1.0	41,000
Hexachlorobutadiene	5.0	NC
Isopropylbenzene	1.0	NC
m,p-xylene*	2.0	100,000[A]
Methyl t-butyl ether	1.0	100,000
Methylene Chloride	1.0	100,000
Methyl Cyclohexane	1.0	NC
n-Butylbenzene	1.0	100,000
n-Propylbenzene	1.0	100,000
Naphthalene	1.0	NC
o-xylene*	1.0	100,000[A]
sec-Butylbenzene	1.0	100,000
Styrene	1.0	NC
t-1,2-Dichloroethene	1.0	100,000
t-1,3-Dichloropropene	1.0	NC
TAME	1.0	NC
tert-Butylbenzene	1.0	100,000
Tertiary butyl alcohol	20	NC
Tetrachloroethene	1.0	19,000
Toluene*	1.0	100,000
Trichloroethene	1.0	21,000
Trichlorofluoromethane	1.0	NC
Vinyl Chloride	1.0	900
Top 10 VOC TICs (summation)	NA	10,000[C]

Table 1A
Soil/Sediment Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Semivolatile Organic Compounds (µg/kg)		
1,2,4-Trichlorobenzene	33	NC
1,2-Dichlorobenzene	330	NC
1,3-Dichlorobenzene	330	NC
1,4-Dichlorobenzene	330	NC
2,3,4,6-Tetrachlorophenol	330	NC
2,4,5-Trichlorophenol	330	NC
2,4,6-Trichlorophenol	330	NC
2,4-Dichlorophenol	330	NC
2,4-Dimethylphenol	330	NC
2,4-Dinitrophenol	1000	NC
2,4-Dinitrotoluene	67	NC
2,6-Dinitrotoluene	67	NC
2-Chloronaphthalene	330	NC
2-Chlorophenol	330	NC
2-Methylnaphthalene*	330	NC
2-Methylphenol	330	100,000
2-Nitroaniline	670	NC
2-Nitrophenol	330	NC
3+4-Methylphenol	330	100,000
3,3'-Dichlorobenzidine	670	NC
3-Nitroaniline	670	NC
4,6-Dinitro-2-methylphenol	1000	NC
4-Bromophenyl phenyl ether	330	NC
4-Chloro-3-methylphenol	330	NC
4-Chloroaniline	330	NC
4-Chlorophenyl phenyl ether	330	NC
4-Nitroaniline	670	NC
4-Nitrophenol	1000	NC
Acenaphthene*	330	100,000
Acenaphthylene*	330	100,000
Aniline	330	NC
Anthracene*	330	100,000
Benzidine	330	NC
Benzo(a)anthracene*	33	1000
Benzo(a)pyrene*	33	1000
Benzo(b)fluoranthene*	33	1000

Table 1A Soil/Sediment Sampling Chemical Parameters, Quantitation Limits and Data Quality Levels		
Parameter	**QL**	**DQL[1]**
Benzo(g,h,i)perylene*	330	100,000
Benzo(k)fluoranthene*	33	3900
Benzoic acid	330	NC
Benzyl alcohol	330	NC
bis(2-Chloroethoxy)methane	330	NC
bis(2-Chloroethyl)ether	33	NC
bis(2-Chloroisopropyl)ether	330	NC
bis(2-Ethylhexyl)phthalate	330	NC
Butyl benzyl phthalate	330	NC
Carbazole	330	NC
Chrysene*	330	3900
Di-n-butyl phthalate	330	NC
Di-n-octyl phthalate	330	NC
Dibenz(a,h)anthracene*	33	330
Dibenzofuran	330	NC
Diethyl phthalate	330	NC
Dimethyl phthalate	330	NC
Fluoranthene*	330	100,000
Fluorene*	330	100,000
Hexachlorobenzene	33	1200
Hexachlorobutadiene	67	NC
Hexachlorocyclopentadiene	330	NC
Hexachloroethane	33	NC
Indeno(1,2,3-cd)pyrene*	33	500
Isophorone	330	NC
N-Nitrosodi-n-propylamine	33	NC
N-Nitrosodimethylamine	330	NC
N-Nitrosodiphenylamine	330	NC
Naphthalene*	330	100,000
Nitrobenzene	33	NC
Pentachlorophenol	1000	6700
Phenanthrene*	330	100,000
Phenol	330	100,000
Pyrene*	330	100,000
Pyridine	330	NC
Top 20 SVOC TICs (summation)	NA	100,000[C]
Metals (mg/kg)		

Table 1A
Soil/Sediment Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Arsenic	1.0	16
Cadmium	1.0	43
Chromium (total)	2.0	110[B]
Copper	5.0	270
Lead	1.0	400
Mercury	0.033	0.81
Nickel	8.0	310
Silver	2.0	180
Zinc	6.0	10,000
TOC (mg/kg)		
Total Organic Carbon	100	NC

QL = Quantitation Limit is the Test America Laboratory Reporting Limit
DQL = Data Quality Level is the Part 375 Restricted Use Soil Cleanup Objectives, Restricted-Residential
NC = No Criterion
NA = Not Applicable
[A] = The Restricted Use SCO for Total Xylenes is 0.26 mg/kg
[B] = The Restricted Use SCO for Hexavalent Chromium is used.
[C] = Site-Specific Soil Clean-up Objectives
*** Sediment samples will be analyzed for these select VOCs and SVOCs.**

Table 1B
Soil Sampling for Disposal Characterization
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Volatile Organic Compounds (µg/kg)		
1,1,1,2-Tetrachloroethane	1.0	TBD
1,1,1-Trichloroethane	1.0	TBD
1,1,2,2-Tetrachloroethane	1.0	TBD
1,1,2-Trichloroethane	1.0	TBD
1,1,2-Trichlorotrifluoroethane	1.0	TBD
1,1-Dichloroethane	1.0	TBD
1,1-Dichloroethene	1.0	TBD
1,1-Dichloropropene	1.0	TBD
1,2,3-Trichlorobenzene	1.0	TBD
1,2,3-Trichloropropane	1.0	TBD
1,2,4-Trichlorobenzene	1.0	TBD
1,2,4-Trimethylbenzene	1.0	TBD
1,2-Dibromo-3-chloropropane	1.0	TBD
1,2-Dibromoethane	1.0	TBD
1,2-Dichlorobenzene	1.0	TBD
1,2-Dichloroethane	1.0	TBD
1,2-Dichloropropane	1.0	TBD
1,3,5-Trimethylbenzene	1.0	TBD
1,3-Dichlorobenzene	1.0	TBD
1,3-Dichloropropane	1.0	TBD
1,4-Dichlorobenzene	1.0	TBD
1,4-Dioxane	50	TBD
2,2-Dichloropropane	1.0	TBD
2-Butanone	10	TBD
2-Chloroethylvinylether	1.0	TBD
2-Chlorotoluene	1.0	TBD
2-Hexanone	10	TBD
4-Chlorotoluene	1.0	TBD
4-Isopropyltoluene	1.0	TBD
4-Methyl-2-pentanone	10	TBD
Acetone	10	TBD
Acrylonitrile	50	TBD
Benzene	1.0	TBD
Bromobenzene	1.0	TBD
Bromochloromethane	1.0	TBD
Bromodichloromethane	1.0	TBD

Table 1B
Soil Sampling for Disposal Characterization
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Bromoform	1.0	TBD
Bromomethane	1.0	TBD
c-1,2-Dichloroethene	1.0	TBD
c-1,3-Dichloropropene	1.0	TBD
Carbon disulfide	1.0	TBD
Carbon Tetrachloride	1.0	TBD
Chlorobenzene	1.0	TBD
Chloroethane	1.0	TBD
Chloroform	1.0	TBD
Chloromethane	1.0	TBD
Cyclohexane	1.0	TBD
Dibromochloromethane	1.0	TBD
Dibromomethane	1.0	TBD
Dichlorodifluoromethane	1.0	TBD
Ethylbenzene	1.0	TBD
Hexachlorobutadiene	5.0	TBD
Isopropylbenzene	1.0	TBD
m,p-xylene	2.0	TBD
Methyl t-butyl ether	1.0	TBD
Methylene Chloride	1.0	TBD
Methyl Cyclohexane	1.0	TBD
n-Butylbenzene	1.0	TBD
n-Propylbenzene	1.0	TBD
Naphthalene	1.0	TBD
o-xylene	1.0	TBD
sec-Butylbenzene	1.0	TBD
Styrene	1.0	TBD
t-1,2-Dichloroethene	1.0	TBD
t-1,3-Dichloropropene	1.0	TBD
TAME	1.0	TBD
tert-Butylbenzene	1.0	TBD
Tertiary butyl alcohol	20	TBD
Tetrachloroethene	1.0	TBD
Toluene	1.0	TBD
Trichloroethene	1.0	TBD
Trichlorofluoromethane	1.0	TBD
Vinyl Chloride	1.0	TBD

Table 1B
Soil Sampling for Disposal Characterization
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Semivolatile Organic Compounds (µg/kg)		
1,2,4-Trichlorobenzene	33	TBD
1,2-Dichlorobenzene	330	TBD
1,3-Dichlorobenzene	330	TBD
1,4-Dichlorobenzene	330	TBD
2,3,4,6-Tetrachlorophenol	330	TBD
2,4,5-Trichlorophenol	330	TBD
2,4,6-Trichlorophenol	330	TBD
2,4-Dichlorophenol	330	TBD
2,4-Dimethylphenol	330	TBD
2,4-Dinitrophenol	1000	TBD
2,4-Dinitrotoluene	67	TBD
2,6-Dinitrotoluene	67	TBD
2-Chloronaphthalene	330	TBD
2-Chlorophenol	330	TBD
2-Methylnaphthalene	330	TBD
2-Methylphenol	330	TBD
2-Nitroaniline	670	TBD
2-Nitrophenol	330	TBD
3+4-Methylphenol	330	TBD
3,3'-Dichlorobenzidine	670	TBD
3-Nitroaniline	670	TBD
4,6-Dinitro-2-methylphenol	1000	TBD
4-Bromophenyl phenyl ether	330	TBD
4-Chloro-3-methylphenol	330	TBD
4-Chloroaniline	330	TBD
4-Chlorophenyl phenyl ether	330	TBD
4-Nitroaniline	670	TBD
4-Nitrophenol	1000	TBD
Acenaphthene	330	TBD
Acenaphthylene	330	TBD
Aniline	330	TBD
Anthracene	330	TBD
Benzidine	330	TBD
Benzo(a)anthracene	33	TBD
Benzo(a)pyrene	33	TBD
Benzo(b)fluoranthene	33	TBD

Table 1B
Soil Sampling for Disposal Characterization
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Benzo(g,h,i)perylene	330	TBD
Benzo(k)fluoranthene	33	TBD
Benzoic acid	330	TBD
Benzyl alcohol	330	TBD
bis(2-Chloroethoxy)methane	330	TBD
bis(2-Chloroethyl)ether	33	TBD
bis(2-Chloroisopropyl)ether	330	TBD
bis(2-Ethylhexyl)phthalate	330	TBD
Butyl benzyl phthalate	330	TBD
Carbazole	330	TBD
Chrysene	330	TBD
Di-n-butyl phthalate	330	TBD
Di-n-octyl phthalate	330	TBD
Dibenz(a,h)anthracene	33	TBD
Dibenzofuran	330	TBD
Diethyl phthalate	330	TBD
Dimethyl phthalate	330	TBD
Fluoranthene	330	TBD
Fluorene	330	TBD
Hexachlorobenzene	33	TBD
Hexachlorobutadiene	67	TBD
Hexachlorocyclopentadiene	330	TBD
Hexachloroethane	33	TBD
Indeno(1,2,3-cd)pyrene	33	TBD
Isophorone	330	TBD
N-Nitrosodi-n-propylamine	33	TBD
N-Nitrosodimethylamine	330	TBD
N-Nitrosodiphenylamine	330	TBD
Naphthalene	330	TBD
Nitrobenzene	33	TBD
Pentachlorophenol	1000	TBD
Phenanthrene	330	TBD
Phenol	330	TBD
Pyrene	330	TBD
Pyridine	330	TBD

Table 1B Soil Sampling for Disposal Characterization Chemical Parameters, Quantitation Limits and Data Quality Levels		
Parameter	**QL**	**DQL[1]**
Metals (mg/kg)		
Aluminum	40	TBD
Antimony	2	TBD
Arsenic	1	TBD
Barium	40	TBD
Beryllium	0.4	TBD
Cadmium	1	TBD
Calcium	1000	TBD
Chromium (total)	2	TBD
Cobalt	10	TBD
Copper	5	TBD
Iron	30	TBD
Lead	1	TBD
Magnesium	1000	TBD
Manganese	3	TBD
Mercury	0.033	TBD
Nickel	8	TBD
Potassium	1000	TBD
Selenium	2	TBD
Silver	2	TBD
Sodium	1000	TBD
Thallium	2	TBD
Vanadium	10	TBD
Zinc	6	TBD
Pesticides (µg/kg)		
4,4'-DDD	6.7	TBD
4,4'-DDE	6.7	TBD
4,4'-DDT	6.7	TBD
Aldrin	6.7	TBD
alpha–BHC	6.7	TBD
alpha-Chlordane	6.7	TBD
beta-BHC	6.7	TBD
delta-BHC	6.7	TBD
Dieldrin	6.7	TBD
Endosulfan I	6.7	TBD
Endosulfan II	6.7	TBD

Table 1B
Soil Sampling for Disposal Characterization
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Endosulfan Sulfate	6.7	TBD
Endrin	6.7	TBD
Endrin Aldehyde	6.7	TBD
Endrin Ketone	6.7	TBD
gamma-BHC (Lindane)	6.7	TBD
gamma-Chlordane	6.7	TBD
Heptachlor	6.7	TBD
Heptachlor Epoxide	6.7	TBD
Methoxychlor	6.7	TBD
Toxaphene	67	TBD
Polychlorinated Biphenyls (PCBs) (µg/kg)		
Aroclor-1016	67	TBD
Aroclor-1221	67	TBD
Aroclor-1232	67	TBD
Aroclor-1242	67	TBD
Aroclor-1248	67	TBD
Aroclor-1254	67	TBD
Aroclor-1260	67	TBD
Aroclor-1262	67	TBD
Aroclor-1268	67	TBD
TCLP VOCs (µg/L)		
Benzene	1.0	500[2]
2-Butanone	5.0	200,000[2]
Carbon Tetrachloride	1.0	500[2]
Chlorobenzene	1.0	100,000[2]
Chloroform	1.0	6000[2]
1,4-Dichlorobenzene	1.0	7500[2]
1,2-Dichloroethane	1.0	500[2]
1,1-Dichloroethene	1.0	700[2]
Tetrachloroethene	1.0	700[2]
Trichloroethene	1.0	500[2]
Vinyl chloride	1.0	200[2]
TCLP SVOCs (µg/L)		
1,4-Dichlorobenzene	40	7500[2]
Hexachloroethane	4.0	3000[2]

Table 1B
Soil Sampling for Disposal Characterization
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Nitrobenzene	4.0	2000[2]
Hexachlorobutadiene	8.0	500[2]
2,4,6-Trichlorophenol	40	2000[2]
2,4,5-Trichlorophenol	40	400,000[2]
2,4-Dinitrotoluene	8.0	130[2]
Hexachlorobenzene	4.0	130[2]
Pentachlorophenol	120	100,000[2]
Pyridine	40	5000[2]
2-Methylphenol	40	200,000[2]
3&4-Methylphenol	40	200,000[2]
TCLP Pesticides (µg/L)		
Gamma-BHC (Lindane)	0.5	400[2]
Chlordane	5.0	30[2]
Endrin	0.5	20[2]
Heptachlor	0.5	8[2]
Heptachlor epoxide	0.5	8[2]
Methoxychlor	0.5	10,000[2]
Toxaphene	5.0	500[2]
TCLP Herbicides (µg/L)		
2,4-D	16.65	10,000[2]
2,4,5-TP (Silvex)	16.65	1000[2]
TCLP Metals (µg/L)		
Arsenic	5.0	5000[2]
Barium	200	100,000[2]
Cadmium	5.0	1000[2]
Chromium	10	5000[2]
Lead	5.0	5000[2]
Mercury	0.2	200[2]
Selenium	10	1000[2]
Silver	10	5000[2]
RCRA Characteristics		
Ignitability	NA	Flashpoint <60°C (140°F)[2]
Corrosivity	NA	pH ≤ 2 or ≥12.5[2]

Table 1B
Soil Sampling for Disposal Characterization
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Reactive Cyanide (mg/kg)	25	250[2]
Reactive Sulfide (mg/kg)	20	500[2]

[1]DQL To Be Determined based on disposal facility acceptance criteria.
[2]DQL based on TCLP standards (SW-846 Chapter 7, Table 7-1) and RCRA characteristics of hazardous waste.
QL = Quantitation Limit is the Test America Laboratory Reporting Limit

Table 1C
Groundwater Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Volatile Organic Compounds (µg/L)		
1,1,1,2-Tetrachloroethane	1.0	5
1,1,1-Trichloroethane	1.0	5
1,1,2,2-Tetrachloroethane	1.0	5
1,1,2-Trichloroethane	1.0	1
1,1,2-Trichlorotrifluoroethane	1.0	5
1,1-Dichloroethane	1.0	5
1,1-Dichloroethene	1.0	5
1,1-Dichloropropene	1.0	5
1,2,3-Trichlorobenzene	1.0	10
1,2,3-Trichloropropane	**1.0**	**0.04**
1,2,4-Trichlorobenzene	1.0	10
1,2,4-Trimethylbenzene	1.0	5
1,2-Dibromo-3-chloropropane	**1.0**	**0.04**
1,2-Dibromoethane	**1.0**	**0.0006**
1,2-Dichlorobenzene	1.0	3
1,2-Dichloroethane	**1.0**	**0.6**
1,2-Dichloropropane	1.0	1
1,3,5-Trimethylbenzene	1.0	5
1,3-Dichlorobenzene	1.0	3
1,3-Dichloropropane	1.0	5
1,4-Dichlorobenzene	1.0	3
1,4-Dioxane	50	NC
2,2-Dichloropropane	1.0	5
2-Butanone	5.0	50
2-Chlorotoluene	1.0	5
2-Hexanone	5.0	50
4-Chlorotoluene	1.0	5
4-Isopropyltoluene	1.0	5
4-Methyl-2-pentanone	5.0	NC
Acetone	5.0	50
Acrylonitrile	2.0	5
Benzene	1.0	1
Bromobenzene	1.0	5
Bromochloromethane	1.0	5
Bromodichloromethane	1.0	50
Bromoform	1.0	50

Table 1C
Groundwater Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Bromomethane	1.0	5
c-1,2-Dichloroethene	1.0	5
c-1,3-Dichloropropene	1.0	0.4[a]
Carbon disulfide	1.0	60
Carbon Tetrachloride	1.0	5
Chlorobenzene	1.0	5
Chloroethane	1.0	5
Chloroform	1.0	7
Chloromethane	1.0	5
Cyclohexane	1.0	NC
Dibromochloromethane	1.0	50
Dibromomethane	1.0	5
Dichlorodifluoromethane	1.0	5
Ethylbenzene	1.0	5
Hexachlorobutadiene	1.0	0.5
Isopropylbenzene	1.0	5
m,p-xylene	2.0	5
Methyl t-butyl ether	1.0	10
Methylene Chloride	1.0	5
Methyl Cyclohexane	1.0	NC
n-Butylbenzene	1.0	5
n-Propylbenzene	1.0	5
Naphthalene	1.0	10
o-xylene	1.0	5
sec-Butylbenzene	1.0	5
Styrene	1.0	5
t-1,2-Dichloroethene	1.0	5
t-1,3-Dichloropropene	1.0	0.4[a]
TAME	1.0	NC
tert-Butylbenzene	1.0	5
Tertiary butyl alcohol	20	NC
Tetrachloroethene	1.0	5
Toluene	1.0	5
Trichloroethene	1.0	5
Trichlorofluoromethane	1.0	5
Vinyl Chloride	1.0	2

Table 1C
Groundwater Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Semivolatile Organic Compounds (µg/L)		
1,2,4-Trichlorobenzene	1.0	5
1,2-Dichlorobenzene	**10**	**3**
1,3-Dichlorobenzene	**10**	**3**
1,4-Dichlorobenzene	**10**	**3**
2,3,4,6-Tetrachlorophenol	**10**	**1**
2,4,5-Trichlorophenol	**10**	**1**
2,4,6-Trichlorophenol	**10**	**1**
2,4-Dichlorophenol	**10**	**5**
2,4-Dimethylphenol	10	50
2,4-Dinitrophenol	**30**	**10**
2,4-Dinitrotoluene	2.0	5
2,6-Dinitrotoluene	2.0	5
2-Chloronaphthalene	10	10
2-Chlorophenol	**10**	**1**
2-Methylnaphthalene	10	NC
2-Methylphenol	**10**	**1**
2-Nitroaniline	**20**	**5**
2-Nitrophenol	**10**	**1**
3+4-Methylphenol	**10**	**1**
3,3'-Dichlorobenzidine	**20**	**5**
3-Nitroaniline	**20**	**5**
4,6-Dinitro-2-methylphenol	**30**	**1**
4-Bromophenyl phenyl ether	10	NC
4-Chloro-3-methylphenol	**10**	**1**
4-Chloroaniline	**10**	**5**
4-Chlorophenyl phenyl ether	10	NC
4-Nitroaniline	**20**	**5**
4-Nitrophenol	**30**	**1**
Acenaphthene	10	20
Acenaphthylene	10	NC
Aniline	**10**	**5**
Anthracene	10	50
Benzidine	**20**	**5**
Benzo(a)anthracene	**1.0**	**0.002**
Benzo(a)pyrene	1.0	ND
Benzo(b)fluoranthene	**1.0**	**0.002**
Benzo(g,h,i)perylene	10	NC

Table 1C
Groundwater Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]
Benzo(k)fluoranthene	**1.0**	**0.002**
Benzoic acid	50	NC
Benzyl alcohol	10	NC
bis(2-Chloroethoxy)methane	**10**	**5**
bis(2-Chloroethyl)ether	1.0	1
bis(2-Chloroisopropyl)ether	**10**	**5**
bis(2-Ethylhexyl)phthalate	**10**	**5**
Butyl benzyl phthalate	10	50
Carbazole	10	NC
Chrysene	**10**	**0.002**
Di-n-butyl phthalate	10	50
Di-n-octyl phthalate	10	50
Dibenz(a,h)anthracene	1.0	NC
Dibenzofuran	10	NC
Diethyl phthalate	10	50
Dimethyl phthalate	10	50
Fluoranthene	10	50
Fluorene	10	50
Hexachlorobenzene	**1.0**	**0.04**
Hexachlorobutadiene	**2.0**	**0.5**
Hexachlorocyclopentadiene	**10**	**5**
Hexachloroethane	1.0	5
Indeno(1,2,3-cd)pyrene	**1.0**	**0.002**
Isophorone	10	50
N-Nitrosodi-n-propylamine	1.0	NC
N-Nitrosodimethylamine	10	NC
N-Nitrosodiphenylamine	10	50
Naphthalene	10	10
Nitrobenzene	**1.0**	**0.4**
Pentachlorophenol	**30**	**1**
Phenanthrene	10	50
Phenol	**10**	**1**
Pyrene	10	50
Pyridine	10	50

Table 1C
Groundwater Sampling
Chemical Parameters, Quantitation Limits and Data Quality Levels

Parameter	QL	DQL[1]

QL = Quantitation Limit is the Test America Laboratory Reporting Limit
DQL = Data Quality Level is the TOGS Class GA Groundwater Quality Standards and Guidance Values
NC = No Criterion
(a) = 0.4 µg/L applies to the sum of cis- and trans-1,3-dichloropropene
ND = Class GA Value is any detected concentration
Shading indicates QL is higher than DQL

Table 1D
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Gas Samples

Parameter	QL	DQL
Volatile Organic Compounds (ppbV) –TO15		
Dichlorodifluoromethane	0.5	NC
Freon 22	0.5	NC
1,2-Dichlorotetrafluoroethane	0.2	NC
Chloromethane	0.5	NC
n-Butane	0.5	NC
Vinyl chloride	0.2	NC
1,3-Butadiene	0.2	NC
Bromomethane	0.2	NC
Chloroethane	0.5	NC
Bromoethene (Vinyl Bromide)	0.2	NC
Trichlorofluoromethane	0.2	NC
Freon TF	0.2	NC
1,1-Dichloroethene	0.2	NC
Acetone	5	NC
Isopropyl alcohol	5	NC
Carbon disulfide	0.5	NC
3-Chloropropene	0.5	NC
Methylene Chloride	0.5	60
tert-Butyl alcohol	5	NC
Methyl tert-butyl ether	0.2	NC
trans-1,2-Dichloroethene	0.2	NC
n-Hexane	0.2	NC
1,1-Dichloroethane	0.2	NC
Methyl Ethyl Ketone	0.5	NC
cis-1,2-Dichloroethene	0.2	NC
1,2- Dichloroethene, Total	0.2	NC
Chloroform	0.2	NC
Tetrahydrofuran	5	NC
1,1,1-Trichloroethane	0.2	NC
Cyclohexane	0.2	NC
Carbon tetrachloride	0.2	NC
2,2,4-Trimethylpentane	0.2	NC
Benzene	0.2	NC
1,2-Dichloroethane	0.2	NC
n-Heptane	0.2	NC
Trichloroethene	0.2	5

Table 1D
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Gas Samples

Parameter	QL	DQL
Methyl methacrylate	0.5	NC
1,2-Dichloropropane	0.2	NC
1,4-Dioxane	5	NC
Bromodichloromethane	0.2	NC
Cis-1,3-Dichloropropene	0.2	NC
Methyl Isobutyl Ketone	0.5	NC
Toluene	0.2	NC
Trans-1,3-Dichloropropene	0.2	NC
1,1,2-Trichloroethane	0.2	NC
Tetrachloroethene	0.2	100
Methyl Butyl Ketone (2-Hexanone)	0.5	NC
Dibromochloromethane	0.2	NC
1,2-Dibromoethane	0.2	NC
Chlorobenzene	0.2	NC
Ethylbenzene	0.2	NC
m,p-Xylene	0.5	NC
Xylene, o-	0.2	NC
Xylene (total)	0.2	NC
Styrene	0.2	NC
Bromoform	0.2	NC
Cumene	0.2	NC
1,1,2,2-Tetrachloroethane	0.2	NC
n-Propylbenzene	0.2	NC
4-Ethyltoluene	0.2	NC
1,3,5-Trimethylbenzene	0.2	NC
2-Chlorotoluene	0.2	NC
Tert-Butylbenzene	0.2	NC
1,2,4-Trimethylbenzene	0.2	NC
Sec-Butylbenzene	0.2	NC
4-Isopropyltoluene	0.2	NC
1,3-Dichlorobenzene	0.2	NC
1,4-Dichlorobenzene	0.2	NC
Benzyl chloride	0.2	NC
n-Butylbenzene	0.2	NC
1,2-Dichlorobenzene	0.2	NC
1,2,4-Trichlorobenzene	0.5	NC
Hexachlorobutadiene	0.2	NC
Naphthalene	0.5	NC

Table 1D
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Gas Samples

Parameter	QL	DQL

QL=Quantitation Limit
DQL=Data Quality Level is the NYSDOH Air Guidance Value
NC=No Criterion

Table 2
Soil, Sediment, Groundwater, and Soil Gas
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples[1]	EPA Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3,4]
Soil	VOCs	Grab	TBD	SW-846 Method 8260B	Cool to 4^0 C; 2 EnCores extruded into DI, 1 EnCore extruded into methanol	48 hours to preservation, 14 days to analysis	(3) 5 gram En-core samplers; (1) 4 oz. glass jar
Sediment	BTEX	Grab	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	48 hours to preservation, 14 days to analysis	(3) 5 gram En-core samplers; (1) 4 oz. glass jar
Soil	SVOCs	Grab	TBD	SW-846 Method 8270D	Cool to 4^0 C	14 days to extract; 40 days to analysis	(1) 8 oz. glass jar
Sediment	PAHs	Grab	TBD	SW-846 Method 8270D	Cool to 4^0 C	14 days to extract; 40 days to analysis	(1) 8 oz. glass jar
Soil/Sediment	Metals	Grab	TBD	SW-846 Method 6010C	Cool to 4^0 C	6 months to analysis	(1) 8 oz. glass jar
Soil/Sediment	Mercury	Grab	TBD	SW-846 Method 7471B	Cool to 4^0 C	28 days to analysis	(1) 8 oz. glass jar
Soil	PCBs	Grab	TBD	SW-846 Method 8082A	Cool to 4^0 C	14 days to extract; 40 days to analysis	(1) 8 oz. glass jar
Soil	Pesticides	Grab	TBD	SW-846 Method 8081B	Cool to 4^0 C	14 days to extract; 40 days to analysis	(1) 8 oz. glass jar
Groundwater	VOCs	Grab	TBD	SW-846 Method 8260B	pH < 2 with HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) 40 mL VOA vials
Groundwater	SVOCs	Grab	TBD	SW-846 Method 8270D	Cool to 4^0 C	7 days to extract; 40 days to analysis	(2) 1 L amber glass jars
Sediment	Total Organic Carbon	Grab	TBD	Lloyd Kahn Method, EPA Region 2	Cool to 4^0 C	14 days to analysis	(1) 300 mL amber glass jar

Table 2
Soil, Sediment, Groundwater, and Soil Gas
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples[1]	EPA Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3,4]
Soil	TCLP VOC	Grab	TBD	SW 846 Methods 1311/8260B	Cool to 4^0 C; no headspace	14 days to TCLP extraction; 14 days from TCLP extraction to analysis	(1) 60 ml VOC vial
Sediment	Grain size	Grab	TBD	ASTM Method D422 (with hydrometer)	None	None	(1) 500 mL polyethylene jar or 16 oz. Ziploc bag
Soil	TCLP SVOC	Grab	TBD	SW 846 Methods 1311/ 8270D	Cool to 4^0 C	14 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis	(1) 950 mL amber glass jar
Soil	TCLP Pesticides	Grab	TBD	SW-846 Methods 1311/8081B	Cool to 4^0 C	14 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis	(1) 950 mL amber glass jar
Soil	TCLP Herbicides	Grab	TBD	SW-846 Methods 1311/8151A	Cool to 4^0 C	14 days to TCLP extraction; 7 days from TCLP extraction to herbicide extraction; 40 days from herbicide extraction to analysis	(1) 950 mL amber glass jar

Table 2
Soil, Sediment, Groundwater, and Soil Gas
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples[1]	EPA Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3,4]
Soil	TCLP Metals	Grab	TBD	SW 846 Methods 1311/ 6010C/7470A	Cool to 4^0 C	Hg: 28 days to TCLP extraction; 28 days from TCLP extraction to analysis Other Metals: 6 months to TCLP extraction; 6 months from TCLP extraction to analysis	(1) 500 mL amber glass jar
Soil	Ignitability	Grab	TBD	SW-846 Method 1010/1030	Cool to 4^0 C	None specified	(1) 500 mL amber glass jar
Soil	Corrosivity	Grab	TBD	SW-846 Method 9045D	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Soil	Reactive cyanide	Grab	TBD	SW-846 Chapter 7, Section 7.3.3	Cool to 4^0 C; no headspace	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Soil	Reactive sulfide	Grab	TBD	SW-846 Chapter 7, Section 7.3.4	Cool to 4^0 C; no headspace	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Soil Gas	VOCs	Grab	TBD	EPA Method TO-15	None	30 days to analysis	(1) Pre-cleaned, evacuated stainless steel canister

[1] Actual number of samples may vary depending on field conditions, sample material availability, and field observations
[2] From date of sample collection
[3] I-Chem Series 300 bottles
[4] MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices
TBD = To Be Determined

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
VOCs	SW-846 Method 8260B	Soil/Sediment	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20 per matrix
			1,2-Dichloroethane-d4	70-130		RPD ≤50		
			4-Bromofluorobenzene	70-130				
			Toluene-d8	70-130				
			Matrix Spikes		Matrix Spikes: One per 20 per matrix	MS/MSDs	RPD	MS/MSDs: One per 20 per matrix
			Chloromethane	50-151		Chloromethane	30	
			Bromomethane	54-142		Bromomethane	30	
			Vinyl chloride	67-133		Vinyl chloride	30	
			Chloroethane	56-146		Chloroethane	30	
			Methylene Chloride	74-137		Methylene Chloride	30	
			Acetone	27-164		Acetone	30	
			Carbon disulfide	72-128		Carbon disulfide	30	
			Trichlorofluoromethane	61-139		Trichlorofluoromethane	30	
			1,1-Dichloroethene	71-126		1,1-Dichloroethene	30	
			1,1-Dichloroethane	76-125		1,1-Dichloroethane	30	
			trans-1,2-Dichloroethene	75-122		trans-1,2-Dichloroethene	30	
			cis-1,2-Dichloroethene	80-120		cis-1,2-Dichloroethene	30	
			Chloroform	77-120		Chloroform	30	
			2-Butanone	77-117		2-Butanone	30	
			1,2-Dichloroethane	76-118		1,2-Dichloroethane	30	
			1,1,1-Trichloroethane	78-117		1,1,1-Trichloroethane	30	
			Carbon tetrachloride	79-118		Carbon tetrachloride	30	
			Benzene*	77-117		Benzene*	30	
			Bromoform	59-125		Bromoform	30	
			Styrene	82-122		Styrene	30	
			m&p-Xylene*	81-121		m&p-Xylene*	30	
			o-Xylene*	82-122		o-Xylene*	30	
			Ethylbenzene*	81-121		Ethylbenzene*	30	
			Chlorobenzene	80-120		Chlorobenzene	30	
			Cyclohexane	80-121		Cyclohexane	30	
			Isopropylbenzene	65-129		Isopropylbenzene	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			2-Hexanone	70-122		2-Hexanone	30	
			MTBE	78-120		MTBE	30	
			Freon TF	73-123		Freon TF	30	
			2-Chloroethyl vinyl ether	74-120		2-Chloroethyl vinyl ether	30	
			1,4-Dioxane	69-131		1,4-Dioxane	30	
			Trichloroethene	79-119		Trichloroethene	30	
			Toluene*	75-115		Toluene*	30	
			trans-1,3-Dichloropropene	67-121		trans-1,3-Dichloropropene	30	
			4-Methyl-2-pentanone	68-120		4-Methyl-2-pentanone	30	
			cis-1,3-Dichloropropene	80-123		cis-1,3-Dichloropropene	30	
			1,2-Dichlorobenzene	80-120		1,2-Dichlorobenzene	30	
			1,3-Dichlorobenzene	80-120		1,3-Dichlorobenzene	30	
			1,4-Dichlorobenzene	80-120		1,4-Dichlorobenzene	30	
			1,2,4-Trichlorobenzene	80-120		1,2,4-Trichlorobenzene	30	
			1,2,3-Trichlorobenzene	75-121		1,2,3-Trichlorobenzene	30	
			1,2-Dichloropropane	82-122		1,2-Dichloropropane	30	
			Methylcyclohexane	78-118		Methylcyclohexane	30	
			Tetrachloroethene	80-120		Tetrachloroethene	30	
			1,2-Dibromo-3-Chloropropane	74-118		1,2-Dibromo-3-Chloropropane	30	
			1,1,2,2-Tetrachloroethane	79-122		1,1,2,2-Tetrachloroethane	30	
			1,1,2-Trichloroethane	73-118		1,1,2-Trichloroethane	30	
			Dibromochloromethane	68-120		Dibromochloromethane	30	
			1,2-Dibromoethane	75-117		1,2-Dibromoethane	30	
			Dichlorodifluoromethane	52-144		Dichlorodifluoromethane	30	
			TBA	65-119		TBA	30	
			Bromochloromethane	74-125		Bromochloromethane	30	
			Acrylonitrile	71-130		Acrylonitrile	30	
			Bromodichloromethane	79-119		Bromodichloromethane	30	
			Naphthalene	78-119		Naphthalene	30	
			1,1-Dichloropropene	78-118		1,1-Dichloropropene	30	
			Hexachlorobutadiene	72-120		Hexachlorobutadiene	30	
			1,1,1,2-Tetrachloroethane	60-126		1,1,1,2-Tetrachloroethane	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			1,2,3-Trichloropropane	80-120		1,2,3-Trichloropropane	30	
			1,2,4-Trimethylbenzene	81-121		1,2,4-Trimethylbenzene	30	
			1,3,5-Trimethylbenzene	82-122		1,3,5-Trimethylbenzene	30	
			1,3-Dichloropropane	77-116		1,3-Dichloropropane	30	
			2,2-Dichloropropane	77-120		2,2-Dichloropropane	30	
			2-Chlorotoluene	81-121		2-Chlorotoluene	30	
			4-Chlorotoluene	82-122		4-Chlorotoluene	30	
			Bromobenzene	80-120		Bromobenzene	30	
			Dibromomethane	79-118		Dibromomethane	30	
			N-Propylbenzene	81-121		N-Propylbenzene	30	
			p-Isopropyltoluene	82-122		p-Isopropyltoluene	30	
			sec-Butylbenzene	82-122		sec-Butylbenzene	30	
			tert-Butylbenzene	82-122		tert-Butylbenzene	30	
			n-Butylbenzene	82-122		n-Butylbenzene	30	
			Tert-amyl methyl ether	79-119		Tert-amyl methyl ether	30	
SVOCs	SW-846 Method 8270D	Soil/Sediment	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates One per 20 per matrix
			Phenol-d5	41-118		RPD ≤50		
			2-Fluorophenol	37-125				
			2,4,6-Tribromophenol	10-120				
			Nitrobenzene-d5	38-105				
			2-Fluorobiphenyl	40-109				
			Terphenyl-d14	16-151				
			Matrix Spikes		Matrix Spikes: One per 20 per matrix per batch	MS/MSDs	RPD	MS/MSDs: One per 20 per matrix per batch
			Phenol	54-115		Phenol	30	
			2-Chlorophenol	56-110		2-Chlorophenol	30	
			2-Methylphenol	54-117		2-Methylphenol	30	
			3 & 4 Methylphenol	47-103		3 & 4 Methylphenol	30	
			Bis(2-chloroethyl)ether	44-101		Bis(2-chloroethyl)ether	30	
			bis (2-chloroisopropyl) ether	45-102		bis (2-chloroisopropyl) ether	30	
			N-Nitrosodi-n-propylamine	42-107		N-Nitrosodi-n-propylamine	30	
			Nitrobenzene	42-106				

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			Hexachloroethane	45-90		Nitrobenzene	30	
			Isophorone	48-97		Hexachloroethane	30	
			2-Nitrophenol	55-101		Isophorone	30	
			2,4-Dimethylphenol	56-112		2-Nitrophenol	30	
			2,4-Dichlorophenol	58-115		2,4-Dimethylphenol	30	
			Benzoic acid	10-137		2,4-Dichlorophenol	30	
			Bis(2-chloroethoxy)methane	51-100		Benzoic acid	30	
			N-Nitrosodimethylamine	40-84		Bis(2-chloroethoxy)methane	30	
			Naphthalene*	53-94		N-Nitrosodimethylamine	30	
			4-Chloroaniline	10-96		Naphthalene*	30	
			Hexachlorobutadiene	45-98		4-Chloroaniline	30	
			1,3-Dichlorobenzene	47-84		Hexachlorobutadiene	30	
			1,4-Dichlorobenzene	47-85		1,3-Dichlorobenzene	30	
			4-Chloro-3-methylphenol	55-117		1,4-Dichlorobenzene	30	
			1,2-Dichlorobenzene	48-87		4-Chloro-3-methylphenol	30	
			2-Methylnaphthalene*	51-98		1,2-Dichlorobenzene	30	
			Hexachlorobenzene	43-104		2-Methylnaphthalene*	30	
			Hexachlorocyclopentadiene	24-98		Hexachlorobenzene	30	
			2,4,6-Trichlorophenol	53-118		Hexachlorocyclopentadiene	30	
			2,4,5-Trichlorophenol	50-115		2,4,6-Trichlorophenol	30	
			2-Chloronaphthalene	51-102		2,4,5-Trichlorophenol	30	
			1,2,4-Trichlorobenzene	48-94		2-Chloronaphthalene	30	
			2-Nitroaniline	51-109		1,2,4-Trichlorobenzene	30	
			2,6-Dinitrotoluene	51-115		2-Nitroaniline	30	
			Dimethyl phthalate	52-112		2,6-Dinitrotoluene	30	
			Acenaphthylene*	51-103		Dimethyl phthalate	30	
			3-Nitroaniline	32-104		Acenaphthylene*	30	
			Acenaphthene*	46-100		3-Nitroaniline	30	
			4-Nitrophenol	45-114		Acenaphthene*	30	
			2,4-Dinitrophenol	10-129		4-Nitrophenol	30	
			Dibenzofuran	52-106		2,4-Dinitrophenol	30	
			Diethyl phthalate	52-114		Dibenzofuran	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			Fluorene*	51-108		Diethyl phthalate	30	
			Fluoranthene*	49-108		Fluorene*	30	
			Di-n-butyl phthalate	50-108		Fluoranthene*	30	
			2,4-Dinitrotoluene	53-110		Di-n-butyl phthalate	30	
			4-Chlorophenyl phenyl ether	50-106		2,4-Dinitrotoluene	30	
			4-Nitroaniline	45-106		4-Chlorophenyl phenyl ether	30	
			4,6-Dinitro-2-methylphenol	10-110		4-Nitroaniline	30	
			4-Bromophenyl phenyl ether	44-102		4,6-Dinitro-2-methylphenol	30	
			Anthracene*	50-107		4-Bromophenyl phenyl ether	30	
			Carbazole	49-104		Anthracene*	30	
			Phenanthrene*	48-108		Carbazole	30	
			Pentachlorophenol	19-113		Phenanthrene*	30	
			Pyrene*	49-116		Pentachlorophenol	30	
			Chrysene*	45-114		Pyrene*	30	
			Benzo[k]fluoranthene*	35-115		Chrysene*	30	
			Benzo[g,h,i]perylene*	43-106		Benzo[k]fluoranthene*	30	
			Benzo[b]fluoranthene*	33-96		Benzo[g,h,i]perylene*	30	
			Benzidine	10-61		Benzo[b]fluoranthene*	30	
			Benzo[a]pyrene*	36-89		Benzidine	30	
			Benzo[a]anthracene*	46-112		Benzo[a]pyrene*	30	
			N-Nitrosodiphenylamine	49-106		Benzo[a]anthracene*	30	
			Butyl benzyl phthalate	49-117		N-Nitrosodiphenylamine	30	
			Bis(2-ethylhexyl) phthalate	49-119		Butyl benzyl phthalate	30	
			Di-n-octyl phthalate	40-106		Bis(2-ethylhexyl) phthalate	30	
			Indeno[1,2,3-cd]pyrene*	43-109		Di-n-octyl phthalate	30	
			Dibenz(a,h)anthracene*	43-107		Indeno[1,2,3-cd]pyrene*	30	
			3,3'-Dichlorobenzidine	24-105		Dibenz(a,h)anthracene*	30	
			2,3,4,6-Tetrachlorophenol	70-130		3,3'-Dichlorobenzidine	30	
			Pyridine	12-74		2,3,4,6-Tetrachlorophenol	30	
			Aniline	35-90		Pyridine	30	
			Benzyl alcohol	51-104		Aniline	30	
						Benzyl alcohol	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
PCBs	SW-846 Method 8082A	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			Decachlorobiphenyl	30-150		RPD ≤50		
			Matrix Spikes		Matrix Spikes: One per 20 per batch	MS/MSDs	RPD	MS/MSDs: One per 20 per batch
			Aroclor 1016	60-144		Aroclor 1016	30	
			Aroclor 1260	63-143		Aroclor 1260	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
Pesticides	SW-846 Method 8081B	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			Decachlorobiphenyl	53-150				
			Tetrachloro-m-xylene	40-150		RPD ≤50		
			Matrix Spikes		Matrix Spikes: One per 20 per batch	MS/MSDs	RPD	MS/MSDs: One per 20 per batch
			Aldrin	58-143		Aldrin	30	
			alpha-BHC	58-138		alpha-BHC	30	
			beta-BHC	60-139		beta-BHC	30	
			delta-BHC	60-141		delta-BHC	30	
			gamma-BHC (Lindane)	58-136		gamma-BHC (Lindane)	30	
			Chlordane	62-150		Chlordane	30	
			4,4'-DDD	63-150		4,4'-DDD	30	
			4,4'-DDE	58-150		4,4'-DDE	30	
			4,4'-DDT	57-150		4,4'-DDT	30	
			Dieldrin	55-128		Dieldrin	30	
			Endosulfan I	60-138		Endosulfan I	30	
			Endosulfan II	59-133		Endosulfan II	30	
			Endosulfan sulfate	56-133		Endosulfan sulfate	30	
			Endrin	61-150		Endrin	30	
			Endrin aldehyde	55-122		Endrin aldehyde	30	
			Endrin ketone	62-139		Endrin ketone	30	
			Heptachlor	58-137		Heptachlor	30	
			Heptachlor epoxide	59-136		Heptachlor epoxide	30	
			Methoxychlor	42-150		Methoxychlor	30	
			Toxaphene	70-130		Toxaphene	30	
			gamma-Chlordane	45-147		gamma-Chlordane	30	
			alpha-Chlordane	49-143		alpha-Chlordane	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
Metals	SW-846 Methods 6010C/ 7470A	Soil/Sediment	Matrix Spikes 75-125% recovery		Matrix Spikes: One per 20 per matrix per batch	Field Duplicates RPD ≤50 Matrix Duplicates RPD ≤30		Field Duplicates: One per 20 per matrix Matrix Duplicates: One per 20 per matrix per batch
TCLP VOCs	SW-846 Methods 1311/8260B	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			1,2-Dichloroethane-d4	70-130				
			4-Bromofluorobenzene	70-130				
			Toluene-d8	70-130				
			Matrix Spikes		Matrix Spikes:	MS/MSDs	RPD	MS/MSDs:
			1,1-Dichloroethene	61-143	One per 20 per batch	1,1-Dichloroethene	30	One per 20 per batch
			1,2-Dichloroethane	76-116		1,2-Dichloroethane	30	
			2-Butanone	61-108		2-Butanone	30	
			Chloroform	85-125		Chloroform	30	
			Carbon Tetrachloride	76-116		Carbon Tetrachloride	30	
			Benzene	84-124		Benzene	30	
			Trichloroethene	82-122		Trichloroethene	30	
			Tetrachloroethene	80-142		Tetrachloroethene	30	
			Chlorobenzene	85-125		Chlorobenzene	30	
			Vinyl chloride	54-138		Vinyl chloride	30	
			1,4-Dichlorobenzene	70-130		1,4-Dichlorobenzene	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
TCLP SVOCs	SW-846 Methods 1311/8270D	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			Phenol-d5	10-48				
			2-Fluorophenol	10-65				
			2,4,6-Tribromophenol	46-122				
			Nitrobenzene-d5	56-112				
			2-Fluorobiphenyl	53-108				
			Terphenyl-d14	50-122				
			Matrix Spikes		Matrix Spikes:	MS/MSDs	RPD	MS/MSDs:
			Hexachloroethane	61-112	One per 20 per batch	Hexachloroethane	30	One per 20 per batch
			Nitrobenzene	49-92		Nitrobenzene	30	
			Hexachlorobutadiene	56-113		Hexachlorobutadiene	30	
			2,4,6-Trichlorophenol	67-115		2,4,6-Trichlorophenol	30	
			2,4,5-Trichlorophenol	66-120		2,4,5-Trichlorophenol	30	
			2,4-Dinitrotoluene	67-126		2,4-Dinitrotoluene	30	
			Hexachlorobenzene	24-98		Hexachlorobenzene	30	
			Pentachlorophenol	50-124		Pentachlorophenol	30	
			Pyridine	14-55		Pyridine	30	
			2-Methylphenol	41-90		2-Methylphenol	30	
			3&4-Methylphenol	30-87		3&4-Methylphenol	30	
TCLP Pesticides	SW-846 Methods 1311/8081B	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			Decachlorobiphenyl	65-150				
			Tetrachloro-m-xylene	51-143				
			Matrix Spikes		Matrix Spikes:	MS/MSDs	RPD	MS/MSDs:
			Gamma-BHC	61-150	One per 20 per batch	Gamma-BHC	30	One per 20 per batch
			Heptachlor	86-150		Heptachlor	30	
			Heptachlor epoxide	67-150		Heptachlor epoxide	30	
			Endrin	51-150		Endrin	30	
			Methoxychlor	34-150		Methoxychlor	30	
			Technical Chlordane	53-150		Technical Chlordane	30	
			Toxaphene	38-147		Toxaphene	30	

Table 3A
Soil/Sediment Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
TCLP Herbicides	SW-846 Methods 1311/8151A	Soil	Surrogates / % Rec. 2,4-DCAA 87-150 Matrix Spikes 2,4-D 52-154 2,4,5-TP 67-142	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per batch	MS/MSDs / RPD 2,4-D 30 2,4,5-TP 30	MS/MSDs: One per 20 per batch
TCLP Metals	SW-846 Methods 1311/6010C/7470A	Soil	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20 per batch	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per batch
Ignitability	SW-846 Method 1010	Soil	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤46	Matrix Duplicates: One per 20 per matrix
Corrosivity	SW-846 Method 9045C	Soil	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤5	Matrix Duplicates: One per 20 per matrix
Reactive cyanide	SW-846 Chapter 7, Section 7.3.3	Soil	Matrix Spikes 10-100% recovery	Not Applicable	Matrix Duplicates RPD ≤10	Matrix Duplicates: One per 20 per matrix
Reactive sulfide	SW-846 Chapter 7, Section 7.3.4	Soil	Matrix Spikes 70-130% recovery	Not Applicable	Matrix Duplicates RPD ≤10	Matrix Duplicates: One per 20 per matrix

* Sediment samples will be analyzed for these select VOCs and SVOCs.

Table 3B
Groundwater Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
VOCs	SW-846 Method 8260B	Groundwater	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates: RPD ≤30		Field Duplicates: One per 20
			1,2-Dichloroethane-d4	70-130				
			Toluene-d8	70-130				
			Bromofluorobenzene	70-130				
			Matrix Spikes		Matrix Spikes: One per 20	Matrix Spikes	RPD	MS/MSDs: One per 20
			Chloromethane	58-146		Chloromethane	30	
			Bromomethane	55-153		Bromomethane	30	
			Vinyl chloride	61-144		Vinyl chloride	30	
			Chloroethane	69-145		Chloroethane	30	
			Methylene Chloride	79-119		Methylene Chloride	30	
			Acetone	45-156		Acetone	30	
			Carbon disulfide	58-139		Carbon disulfide	30	
			Trichlorofluoromethane	69-147		Trichlorofluoromethane	30	
			1,1-Dichloroethene	56-139		1,1-Dichloroethene	30	
			1,1-Dichloroethane	78-122		1,1-Dichloroethane	30	
			trans-1,2-Dichloroethene	75-122		trans-1,2-Dichloroethene	30	
			cis-1,2-Dichloroethene	80-120		cis-1,2-Dichloroethene	30	
			Chloroform	82-123		Chloroform	30	
			1,2-Dichloroethane	74-118		1,2-Dichloroethane	30	
			2-Butanone	65-114		2-Butanone	30	
			1,1,1-Trichloroethane	74-128		1,1,1-Trichloroethane	30	
			Carbon tetrachloride	73-120		Carbon tetrachloride	30	
			Bromodichloromethane	79-119		Bromodichloromethane	30	
			1,2-Dichloropropane	80-120		1,2-Dichloropropane	30	
			cis-1,3-Dichloropropene	80-120		cis-1,3-Dichloropropene	30	
			Trichloroethene	78-119		Trichloroethene	30	
			Dibromochloromethane	80-120		Dibromochloromethane	30	
			1,1,2-Trichloroethane	79-119		1,1,2-Trichloroethane	30	
			Benzene	83-124		Benzene	30	
			trans-1,3-Dichloropropene	78-118		trans-1,3-Dichloropropene	30	

Table 3B
Groundwater Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			Bromoform	73-123		Bromoform	30	
			4-Methyl-2-pentanone	53-120		4-Methyl-2-pentanone	30	
			2-Hexanone	53-121		2-Hexanone	30	
			Tetrachloroethene	68-139		Tetrachloroethene	30	
			1,1,2,2-Tetrachloroethane	74-126		1,1,2,2-Tetrachloroethane	30	
			Toluene	80-120		Toluene	30	
			Chlorobenzene	81-121		Chlorobenzene	30	
			Ethylbenzene	79-126		Ethylbenzene	30	
			Styrene	69-112		Styrene	30	
			m&p-Xylene	76-120		m&p-Xylene	30	
			o-Xylene	78-118		o-Xylene	30	
			Freon TF	47-139		Freon TF	30	
			TBA	49-112		TBA	30	
			Acrylonitrile	48-135		Acrylonitrile	30	
			MTBE	71-115		MTBE	30	
			Cyclohexane	58-133		Cyclohexane	30	
			1,2-Dibromoethane	78-118		1,2-Dibromoethane	30	
			1,3-Dichlorobenzene	81-126		1,3-Dichlorobenzene	30	
			1,4-Dichlorobenzene	83-123		1,4-Dichlorobenzene	30	
			1,2-Dichlorobenzene	82-122		1,2-Dichlorobenzene	30	
			Naphthalene	69-126		Naphthalene	30	
			Dichlorodifluoromethane	46-145		Dichlorodifluoromethane	30	
			1,1-Dichloropropene	75-120		1,1-Dichloropropene	30	
			1,2,4-Trichlorobenzene	66-120		1,2,4-Trichlorobenzene	30	
			Hexachlorobutadiene	50-130		Hexachlorobutadiene	30	
			1,4-Dioxane	52-126		1,4-Dioxane	30	
			1,1,1,2-Tetrachloroethane	81-121		1,1,1,2-Tetrachloroethane	30	
			1,2,3-Trichlorobenzene	76-123		1,2,3-Trichlorobenzene	30	
			1,2,3-Trichloropropane	77-114		1,2,3-Trichloropropane	30	
			1,2,4-Trimethylbenzene	68-120		1,2,4-Trimethylbenzene	30	
			1,2-Dibromo-3-Chloropropane	70-116		1,2-Dibromo-3-Chloropropane	30	
			1,3,5-Trimethylbenzene	69-118		1,3,5-Trimethylbenzene	30	

Table 3B
Groundwater Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			1,3-Dichloropropane	77-117		1,3-Dichloropropane	30	
			2,2-Dichloropropane	73-139		2,2-Dichloropropane	30	
			2-Chlorotoluene	80-128		2-Chlorotoluene	30	
			4-Chlorotoluene	82-128		4-Chlorotoluene	30	
			Bromobenzene	80-122		Bromobenzene	30	
			Bromochloromethane	80-121		Bromochloromethane	30	
			Dibromomethane	79-119		Dibromomethane	30	
			Isopropylbenzene	80-125		Isopropylbenzene	30	
			N-Propylbenzene	67-130		N-Propylbenzene	30	
			p-Isopropyltoluene	47-138		p-Isopropyltoluene	30	
			sec-Butylbenzene	64-124		sec-Butylbenzene	30	
			tert-Butylbenzene	65-116		tert-Butylbenzene	30	
			n-Butylbenzene	77-129		n-Butylbenzene	30	
			Methylcyclohexane	61-129		Methylcyclohexane	30	
			Tert-amyl methyl ether	57-135		Tert-amyl methyl ether	30	
SVOCs	SW-846 Method 8270D	Groundwater	Surrogates	% Rec	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			Phenol-d5	10-48		RPD ≤30		
			2-Fluorophenol	10-65				
			2,4,6-Tribromophenol	46-122				
			Nitrobenzene-d5	56-112				
			2-Fluorobiphenyl	53-108				
			Terphenyl-d14	50-122				
			Matrix Spikes/LCSs		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			Phenol	12-44		Phenol	30	
			2-Chlorophenol	53-101		Chlorophenol	30	
			2-Methylphenol	40-90		2-Methylphenol	30	
			3 & 4 Methylphenol	30-75		3 & 4 Methylphenol	30	
			2-Nitrophenol	65-107		2-Nitrophenol	30	
			2,4-Dimethylphenol	55-100		2,4-Dimethylphenol	30	
			2,4-Dichlorophenol	64-107		2,4-Dichlorophenol	30	
			4-Chloro-3-methylphenol	57-106		4-Chloro-3-methylphenol	30	

Table 3B
Groundwater Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			2,4,6-Trichlorophenol	67-111		2,4,6-Trichlorophenol	30	
			2,4,5-Trichlorophenol	67-114		2,4,5-Trichlorophenol	30	
			2,4-Dinitrophenol	19-113		2,4-Dinitrophenol	30	
			4-Nitrophenol	10-44		4-Nitrophenol	30	
			4,6-Dinitro-2-methylphenol	58-115		4,6-Dinitro-2-methylphenol	30	
			Pentachlorophenol	55-116		Pentachlorophenol	30	
			Benzoic acid	10-21		Benzoic acid	30	
			N-Nitrosodimethylamine	24-66		N-Nitrosodimethylamine	30	
			Bis(2-chloroethyl)ether	62-108		Bis(2-chloroethyl)ether	30	
			1,3-Dichlorobenzene	54-97		1,3-Dichlorobenzene	30	
			1,4-Dichlorobenzene	59-98		1,4-Dichlorobenzene	30	
			1,2-Dichlorobenzene	57-98		1,2-Dichlorobenzene	30	
			N-Nitrosodi-n-propylamine	70-109		N-Nitrosodi-n-propylamine	30	
			Hexachloroethane	50-99		Hexachloroethane	30	
			Nitrobenzene	66-106		Nitrobenzene	30	
			Isophorone	68-108		Isophorone	30	
			Bis(2-chloroethoxy)methane	69-108		Bis(2-chloroethoxy)methane	30	
			1,2,4-Trichlorobenzene	58-98		1,2,4-Trichlorobenzene	30	
			Naphthalene	63-101		Naphthalene	30	
			4-Chloroaniline	58-105		4-Chloroaniline	30	
			Hexachlorobutadiene	52-99		Hexachlorobutadiene	30	
			2-Methylnaphthalene	66-102		2-Methylnaphthalene	30	
			Hexachlorocyclopentadiene	40-105		Hexachlorocyclopentadiene	30	
			2-Chloronaphthalene	65-107		2-Chloronaphthalene	30	
			2-Nitroaniline	73-116		2-Nitroaniline	30	
			Dimethyl phthalate	69-111		Dimethyl phthalate	30	
			Acenaphthylene	67-107		Acenaphthylene	30	
			2,6-Dinitrotoluene	68-114		2,6-Dinitrotoluene	30	
			3-Nitroaniline	59-108		3-Nitroaniline	30	
			Acenaphthene	66-108		Acenaphthene	30	
			Dibenzofuran	68-105		Dibenzofuran	30	
			2,4-Dinitrotoluene	65-113		2,4-Dinitrotoluene	30	

Table 3B
Groundwater Samples
Data Quality Objectives for Precision and Accuracy

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
			Diethyl phthalate	66-109		Diethyl phthalate	30	
			4-Chlorophenyl phenyl ether	68-105		4-Chlorophenyl phenyl ether	30	
			Fluorene	68-105		Fluorene	30	
			4-Nitroaniline	49-119		4-Nitroaniline	30	
			N-Nitrosodiphenylamine	71-121		N-Nitrosodiphenylamine	30	
			4-Bromophenyl phenyl ether	66-110		4-Bromophenyl phenyl ether	30	
			Hexachlorobenzene	65-107		Hexachlorobenzene	30	
			Phenanthrene	68-110		Phenanthrene	30	
			Anthracene	68-108		Anthracene	30	
			Carbazole	67-110		Carbazole	30	
			Di-n-butyl phthalate	68-111		Di-n-butyl phthalate	30	
			Fluoranthene	68-108		Fluoranthene	30	
			Pyrene	61-110		Pyrene	30	
			Benzidine	10-127		Benzidine	30	
			Butyl benzyl phthalate	66-115		Butyl benzyl phthalate	30	
			3,3'-Dichlorobenzidine	69-129		3,3'-Dichlorobenzidine	30	
			Benzo[a]anthracene	65-106		Benzo[a]anthracene	30	
			Chrysene	68-112		Chrysene	30	
			Bis(2-ethylhexyl) phthalate	66-114		Bis(2-ethylhexyl) phthalate	30	
			Di-n-octyl phthalate	51-115		Di-n-octyl phthalate	30	
			Benzo[b]fluoranthene	65-111		Benzo[b]fluoranthene	30	
			Benzo[k]fluoranthene	66-114		Benzo[k]fluoranthene	30	
			Benzo[a]pyrene	58-101		Benzo[a]pyrene	30	
			Indeno[1,2,3-cd]pyrene	68-121		Indeno[1,2,3-cd]pyrene	30	
			Dibenz(a,h)anthracene	67-124		Dibenz(a,h)anthracene	30	
			Benzo[g,h,i]perylene	65-134		Benzo[g,h,i]perylene	30	
			Pyridine	12-62		Pyridine	30	
			Aniline	39-89		Aniline	30	
			Benzyl alcohol	40-91		Benzyl alcohol	30	
			bis (2-chloroisopropyl) ether	68-107		bis (2-chloroisopropyl) ether	30	
			2,3,4,6-Tetrachlorophenol	70-130		2,3,4,6-Tetrachlorophenol	30	

Table 3C
Test America Laboratories Data Quality Objectives: Precision and Accuracy: Soil Gas Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs	EPA Method TO-15	Soil Gas	LCS All target compounds 70-130%	LCS: one per analytical batch	Matrix Duplicates RPD ≤25	Matrix Duplicates One per 20

4.0 SOIL, SEDIMENT, GROUNDWATER, AND SOIL GAS SAMPLING PLAN

Environmental sampling for the remedial investigation and action of the Former Cibro Petroleum Terminal Site will include soil, sediment, groundwater, and soil gas. Direct push methods will be the preferred method for obtaining subsurface soil and installing groundwater monitoring wells; however, other drilling methods including hollow stem auger or hand augering may also be used if warranted by site conditions.

4.1 Soil Sampling

4.1.1 Post-Tank Foundation Removal Soil Sampling

Post-tank foundation removal soil sampling will be performed to investigate soil adjacent to and below the remaining tank foundations not previously characterized. After the removal of the remaining tank foundations, samples will be collected one (1) per 100 linear feet of tank circumference and one (1) per 2,500 square feet of tank foundation area, with a minimum of two foundation area samples per tank. Boring locations will be biased towards areas with indications of potential contamination, stained concrete, or deteriorated concrete.

At each boring location, direct-push equipment will be used to advance 4- or 5-foot long 2-inch diameter macro-core samplers to collect soil samples continuously from ground surface to the termination depth of each boring. Borings will be advanced to the top of the peat layer or if the peat layer is not encountered, to four feet below the current water table.

The soil samples will be screened for organic vapors utilizing a portable photoionization detector (PID). Field observations, including evidence of contamination (i.e., odors, staining, separate phase hydrocarbons, etc.), debris (i.e., concrete, brick, asphalt, wood), PID readings, and geological descriptions of each soil sample will be recorded in a field logbook. Soil samples will be selected from the 6-inch interval exhibiting the highest concentration of VOC vapors or where other evidence of contamination (i.e., odors, staining, fill material, etc.) is noted. If none of the soil exhibits evidence of contamination, the sample interval from 0 to 1 foot below the current water table elevation will be analyzed. Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Using the EnCore® samplers, three aliquots of sample will be collected directly from the sampler as soon as possible for VOC analysis,

and then immediately placed on ice. This will be performed prior to the collection of samples for other parameters. These soil samples will be analyzed for VOCs + 10 TICs and SVOCs+ 20 TICs. The analytical methods and lists of analytes are included in Tables 1 and 2.

4.1.2 Soil/Material Reuse Sampling

Reuse sampling will be performed on material (soil, concrete, and recycled concrete aggregate) to be reused on-Site. Stockpile sizes will be limited to 1,000 cubic yards or less. One composite material/soil sample will be collected and analyzed for SVOCs + 20 TICs and two discrete (grab) soil samples will be collected and analyzed for VOCs + 10 TICs for every 1,000 cubic yards of soil. The analytical methods and lists of analytes are included in Tables 1 and 2.

The existing on-Site stockpiles of soil, concrete, and recycled concrete aggregate will be sampled at the same frequency and for the same parameters as described above if the material originated from the project Site following the sorting and screening of the material. For the existing on-Site stockpiles which did not originate from the Site, the composite reuse sample will also be analyzed for TAL metals, PCBs, and pesticides. The analytical methods and lists of analytes are included in Tables 1 and 2.

4.1.3 Post-Excavation Soil Sampling

Post-excavation soil sampling will be performed on a 50-foot by 50-foot grid. Post-excavation samples will consist of one grab sample from the bottom of each 50-foot by 50-foot grid and one grab sample for each side of the 50-foot by 50-foot grid that abuts the property boundary or a change in elevation (i.e., sidewalls were the base of excavation changes). These soil samples will be analyzed for VOCs + 10 TICs and SVOCs+ 20 TICs. The analytical methods and lists of analytes are included in Tables 1 and 2.

4.1.4 Soil/Material Import Sampling

This section presents the requirements for sampling of soil/material to be imported to the Site. Materials from virgin sources will be tested initially, and will consist of collecting and analyzing one sample for the parameters described below. Materials from non-virgin sources will be tested initially at a frequency one five point composite and two discrete VOC samples for every 1,000 cubic yards of imported material. If, based on the initial analytical results, the material is suitable

for import, a lesser frequency of testing may be proposed to the NYSDEC for approval on a case-by-case basis.

The exception to the composite sampling will be the portion of each sample that will be submitted for analysis for VOCs, which will not be homogenized and will consist of a grab sample. The parameters to be analyzed for include TCL VOCs, TCL SVOCs, TCL pesticides/polychlorinated biphenyls (PCBs), TCL herbicides, and TAL metals.

4.2 Groundwater Sampling

Post-remediation performance groundwater monitoring will consist of groundwater sampling for characterization of the dissolved phase constituents in post-remediation groundwater. It is expected that during soil removal activities, many, if not all of the existing wells that were installed as part of historic remedial investigations will be removed or damaged. Therefore, as soon as possible, following the completion of the remedial activities, monitoring wells necessary for performance groundwater monitoring will be installed and sampled as described below.

Groundwater sampling is described according to the following distinct phases of this work: well construction, well purging, and well sampling.

4.2.1 Well Construction

It is expected that during soil removal activities, many, if not all of the existing wells that were installed as part of historic remedial investigations will be removed or damaged. Therefore, following the completion of the remedial activities, monitoring wells necessary for performance groundwater monitoring will be installed and sampled as described below. It is anticipated that the performance monitoring well system will also be used for the long-term monitoring program described in the Site Management Plan. Therefore, the locations of the wells need to be accessible once the site is redeveloped. To accomplish this, monitoring wells will be located in one upgradient location, one mid-site location and two downgradient locations as close as possible to existing wells that had dissolved constituents in the recent samples.
The construction of these wells is intended to replicate their original design (i.e., screened intervals). These wells will be allowed to equilibrate for approximately one week following the installation prior to sampling.

Groundwater monitoring wells will be constructed of threaded two-inch or four-inch-diameter PVC well casing and 10-slot well screen. Clean silica sand, Morie No. 1, or equivalent, will be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. Solid PVC riser, attached to the well screen, will extend to grade or above if the well is a stick-up. For a two-inch diameter well, the annular space for the filter pack should be between 2 to 4 inches thick. (The 4 ¼ inside diameter hollow stem augers will have to be retracted as the filter pack is installed to yield the required annular space.) A two-foot thick bentonite seal will then be placed above the sand pack and moistened with potable water for a minimum of 15 minutes before backfilling the remaining space with a cement-bentonite grout. If warranted by depth, filling will be completed using a tremie pipe placed below the surface of the grout. A stick-up or flush-mount protective casing with a locking well cap will then be installed and a measuring point marked on each PVC well riser. Well construction diagrams will be prepared for each well.

4.2.2 Well Purging

The objective is to purge monitoring wells until turbidity stabilizes to a level as low as possible and this parameter will be given the greatest weight in determining when groundwater sampling may begin. With this objective in mind, a low-flow pump will be used to avoid entrainment of particulates within the well or from the formation. Groundwater from each well will be purged until parameters have stabilized. A turbidity level of fifty NTUs or less is the well purging goal, but not an absolute value before sampling. Other field parameters including temperature, conductivity, pH, and dissolved oxygen (DO) will also be monitored. As practical, all field measurements will be taken from the flow cell and will be recorded during and after purging, and before sampling. Field parameters should generally be within ±10 percent for three consecutive readings, one minute apart, prior to sampling.

Upon opening each monitoring well and point, the concentration of VOCs in the headspace will be measured using a PID and water level measurements will be recorded using an electronic oil-water interface probe. The depth to product (if present), depth to water, and the total depth will be measured from the top of the marked PVC casings. Water level and free product measurements will first be made and the volume of water in the well determined. The volume of water in the well will be calculated so that the number of well volumes purged and an estimate of the time required to purge the well can be made. Before sampling, the wells will be purged utilizing a low-flow

submersible stainless steel pump using dedicated Teflon® or Teflon®-lined polyethylene tubing connected to a flow cell. Very low purging rates are proposed, on the order of 100 ml/minute to 500 ml/minute, to minimize suspension of particulate matter in the well.

Purging will be done with the pump intake placed at the midpoint of the well screen or the midpoint of the water column (to be determined based on the depth and length of the screen interval) to insure that all stagnant water in the well is removed, while not stirring up sediment that may have accumulated on the bottom of the well. Equipment will be lowered into the well very carefully to prevent suspension of bottom sediment and subsequent entrainment onto sampling equipment. Surging will be avoided. Tubing will be replaced between each well. Pumps must be carefully cleaned between wells according to the procedures specified in Section 4.10. It is anticipated that no more than three well volumes will be purged in order for turbidity to reach a minimum and the other parameters to stabilize. Ideally, pumping rates will be at a rate so that no drawdown of the groundwater level occurs (i.e., pumping rate is less than recharge rate). During purging, TRC will actively monitor and track the volume of water purged and the field parameter readings. Data will be recorded in the field logbook. For example, TRC will record the running total volume purged from each well and note the readings for the corresponding field parameters.

4.2.3 Well Sampling

Once groundwater conditions have stabilized and groundwater levels have recovered, samples for VOC and SVOC analysis will be collected using a low-flow pump used or purging. All sampling equipment will be cleaned according to the procedures specified in Section 4.10.

The VOC vials must be filled so a meniscus forms over the mouth of the vial. This ensures no air bubbles or headspace will be formed after it has been capped. Ensure the lack of air bubbles and headspace by turning the vial upside down and tapping it lightly. If any bubbles are observed, discard the sample and collect a new sample. The acid must be added to the vials before sample collection.

The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all samples bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled so as

to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter.

4.3 Sediment Sampling

A ten foot long vibacore sampler will be used to collect sediment core samples from five locations. The sampler will be advanced to 10 feet below sediment surface or refusal, whichever is encountered first. The sediment cores will be photographed and inspected for evidence of potential petroleum contamination (e.g., discoloration, sheen or product, or elevated PID readings).

- If no evidence of petroleum impacts are encountered and the core appears to be composed of consistent material throughout, the core will be composited and a sample submitted for laboratory analysis.
- If evidence of potential petroleum impacts are encountered in any core or any core appears to be composed of more than one type of sediment, then up to two depth intervals that exhibit the highest potential for contamination (based on field observations) will be selected for analysis. If there is no evidence of contamination, samples from 0 to 6 inches and 1 to 2 feet below sediment surface will be submitted for analysis.

The samples selected for laboratory analysis will be analyzed for the following:

- Grain Size (ASTM Method D41/D42)
- Total Organic Carbon (USEPA 9060A)
- Metals (USEPA Method 6010B/7470): As, Hg, Cd, Pb, Cr, Ni, Ag, Zn, and Cu
- Total PAHs (USEPA 8270)
- Total BTEX and Benzene (USEPA 8021, 8260B)

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.) The samples will be collected with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs will be placed directly into the sample containers without homogenization. Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Only clean metal instruments will be allowed to touch the sample.

Each sample selected for laboratory analysis will be homogenized separately by thoroughly mixing in a clean stainless steel pan using a clean stainless steel, aluminum or Teflon® sampling tool. The exception to this will be the portion of each sample that will be submitted for analysis for VOCs which will not be homogenized.

4.4 Soil Gas Sampling

After soil excavation and backfilling is complete, post-remediation soil gas sampling will be performed. Soil gas sampling will be conducted in accordance with the NYSDOH document titled, "Guidance for Evaluating Soil Vapor Intrusion in the State of New York". After each soil gas sample is collected, the location will be field screened for methane using a landfill gas meter.

A direct-drive rig will be utilized to drive rods with a decontaminated stainless steel probe through six-mil plastic sheeting to the desired sample depth, which will be approximately 1.5 feet above the capillary fringe, which will typically be encountered at a depth of 3 to 4 feet bgs. The soil gas probe will then be purged at a flow rate not greater than 0.2 liters/minute to evacuate one to three volumes using a PID with an integrated vacuum pump (PhotoVac 2020 or appropriate alternate). No PID readings will be taken prior to sample collection. Following the stabilization period, each probe will be connected to an evacuated laboratory-supplied passivated stainless steel canister that has been cleaned and certified contaminant-free by the contract laboratory. Each canister will be shipped to the sampling site under a high vacuum (30" Hg) to ensure that the canister remains free of contaminants prior to use. After connecting the canister to the soil gas probe, a regulator valve on the canister will be opened and the vacuum will slowly draw the sample into the canister over a period of 30 minutes. The samples will not be drawn at greater than 0.2 liters per minute. After collecting the soil gas sample, the valve will be closed and disconnected from the soil gas probe. The soil-gas samples will be shipped overnight to a New York ELAP certified laboratory for TO-15 analysis.

A tracer gas (e.g., helium, butane, or sulfur hexafluoride) will be utilized prior to sample collection to evaluate the potential for infiltration of outdoor air into the sample. Subsequent rounds of soil gas sampling would include the use of tracer gas only if the initial round of sampling indicates that outdoor air has the potential to influence soil gas sample results.

When soil vapor samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

4.5 Solid Waste

Solid sampling methods include utilizing dedicated stainless steel or Teflon® scoops/shovels, triers, and thiefs. Scoops and shovels are the preferred method for sampling solids from piles or containers. Stainless steel triers are similar to a scoop and are used for the collection of a core sample of a solid material. Thiefs are long hollow tubes, with an inner tube, and are used for sampling of dry free running solids (e.g., pile of fine sand). To sample solid material at varying depths, a hollow stem auger or a core sampler in conjunction with an auger can be utilized (See Soil Sampling Section).

4.6 Liquid Waste

Liquid sampling methods include utilizing dedicated dippers, glass tube samplers, pump and tubing, kemmerer bottles, and Bacon Bomb samplers. Dippers are used to collect samples from the surface of the liquid, and are appropriate for wastes that are homogeneous. Glass tube samplers consist of glass tubes of varying length and diameter used to collect a full-depth liquid sample from a drum or similar container. Pump and tubing (e.g., bladder pump or peristaltic pump) are used to collect liquid samples from a depth (up to approximately 20 feet below grade), and are typically relied upon for sampling subsurface structures, such as underground storage tanks. To minimize the loss of volatile organic components in the liquid, the lowest achievable flow rate is utilized for collecting the sample by this method. Kemmerer bottles and Bacon Bomb samplers are discrete-depth samplers. These samplers are lowered into the liquid and opened to collect a sample at a desired depth.

4.7 Grab and Composite Sampling

Waste characterization of a liquid or a solid can involve grab or composite sampling depending upon the homogeneity and the volume of the waste. Grab sampling consists of collecting discrete sample or samples of a material, and submitting each sample for separate analysis. Grab sampling is appropriate for characterizing small quantities of waste as well as waste streams of varying content (e.g., drums of different contents). Composite sampling consists of taking discrete grab samples of a material and combining them into a smaller number of samples for analysis. Composite sampling generally is appropriate for large volumes of a homogenous waste material, such as a pile of soil or construction debris. The specific number of composite and grab samples largely will depend upon the size and nature of the waste as well as the analysis required for characterization of the waste.

4.8 QC Sample Collection

QC samples will include equipment blanks, trip blanks, field duplicates and MS/MSDs.

Equipment blanks will consist of distilled water and will be used to check for potential contamination of the equipment which may cause sample contamination. Equipment blanks will be collected by routing the distilled water through the sampling equipment prior to sample collection. Equipment blanks will be submitted to the laboratory at a frequency of one per 20 samples per matrix per type of non-dedicated equipment being used per parameter. Equipment blanks will not be collected with samples submitted for TCLP parameters, samples collected for disposal characterization purposes, soil gas samples, and samples collected for grain size analysis.

Trip blanks will consist of distilled water (supplied by the laboratory) for groundwater samples and will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant migration during sample shipment and storage. Trip blanks will be transported to the site unopened, stored with the investigative samples, and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler which contains VOC groundwater samples.

Field duplicates are an additional aliquot of the same sample submitted for the same parameters as the original sample. Field duplicates will be used to assess the sampling and analytical

reproducibility. Field duplicates will be collected by alternately filling sample bottles from the source being sampled. Field duplicates will be submitted at a frequency of one per 20 samples for all matrices and all parameters with the exception of TCLP parameters, samples collected for disposal characterization purposes, soil gas samples, and samples collected for grain size analysis. It should be noted that due to the uncertainty of acceptable representative soil gas volume, field duplicates are not planned for this matrix.

MSs and MSDs are two additional aliquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs will be submitted at a frequency of one per 20 investigative samples per matrix for organic parameters for soil, sediment and groundwater. MSs will be submitted at a frequency of one per 20 investigative samples per matrix for inorganic parameters.

Refer to Table 4 for a summary of QC sample preservation and container requirements.

4.9 Sample Preservation and Containerization

The analytical laboratory will supply the sample containers for the chemical samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's *Specifications and Guidance for Contaminant-Free Sample Containers*. Certificates of analysis are provided with each bottle lot and maintained on file to document conformance to EPA specifications. The containers will be pre-preserved, where appropriate (See Table 2).

4.10 Equipment Decontamination

4.10.1 Sampling Equipment

Re-usable Teflon®, stainless steel, and aluminum sampling equipment shall be cleaned between each use in the following manner:

- Wash and scrub with Alconox and water mixture
- Tap water rinse

- Wash/scrub with a biodegradable degreaser ("ZEP") if there is oily residue on equipment surface
- Tap water rinse
- Distilled/deionized water rinse
- Air dry

Cleaned equipment shall be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with deionized water.

Table 4
Soil, Sediment, Groundwater and Soil Gas
QC Sample Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2]
Soil	VOCs	Field Duplicate	1 per 20	SW-846 Method 8260B	Cool to 4^0 C; 2 EnCores extruded into DI, 1 EnCore extruded into methanol	48 hours to preservation, 14 days to analysis	(3) 5 gram En-core samplers; (1) 4 oz. glass jar
Sediment	BTEX	Field Duplicate	1 per 20	SW-846 Method 8260B	Cool to 4^0 C; 2 EnCores extruded into DI, 1 EnCore extruded into methanol	48 hours to preservation, 14 days to analysis	(3) 5 gram En-core samplers; (1) 4 oz. glass jar
Soil	SVOCs	Field Duplicate	1 per 20	SW-846 Method 8270D	Cool to 4^0 C	14 days to extract; 40 days to analysis	(1) 8 oz. glass jar
Sediment	PAHs	Field Duplicate	1 per 20	SW-846 Method 8270D	Cool to 4^0 C	14 days to extract; 40 days to analysis	(1) 8 oz. glass jar
Soil/Sediment	Metals	Field Duplicate	1 per 20	SW-846 Method 6010C	Cool to 4^0 C	6 months to analysis	(1) 8 oz. glass jar
Soil/Sediment	Mercury	Field Duplicate	1 per 20	SW-846 Method 7471B	Cool to 4^0 C	28 days to analysis	(1) 8 oz. glass jar
Groundwater	VOCs	Field Duplicate	1 per 20	SW-846 Method 8260B	pH < 2 with HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) 40 mL VOA vials
Groundwater	SVOCs	Field Duplicate	1 per 20	SW-846 Method 8270D	Cool to 4^0 C	7 days to extract; 40 days to analysis	(2) 1 L amber glass jars
Aqueous	VOCs	Equipment Blank (for groundwater sampling)	1 per 20	SW-846 Method 8260B	pH < 2 with HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) 40 mL VOA vials

Table 4
Soil, Sediment, Groundwater and Soil Gas
QC Sample Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2]
Aqueous	SVOCs	Equipment Blank (for groundwater sampling)	1 per 20	SW-846 Method 8270D	Cool to 4° C	7 days to extract; 40 days to analysis	(2) 1 L amber glass jars
Aqueous	VOCs	Trip Blank (for groundwater sampling)	1 per cooler with VOCs	SW-846 Method 8260B	pH < 2 with HCl; Cool to 4° C; no headspace	14 days to analysis	(3) 40 mL VOA vials
Aqueous	VOCs (including BTEX)	Equipment Blank (for soil or sediment sampling)	1 per 20 per matrix	SW-846 Method 8260B	pH < 2 with HCl; Cool to 4° C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	SVOCs (including PAHs)	Equipment Blank (for soil or sediment sampling)	1 per 20 per matrix	SW-846 Method 8270D	Cool to 4° C	7 days to extract; 40 days to analysis	(2) 1 L amber glass jars
Aqueous	Metals	Equipment Blank (for sediment sampling)	1 per 20	SW-846 Method 6010C/7470A	pH < 2 with HNO_3; Cool to 4° C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 1 L polyethylene container

[1] From date of sample collection
[2] I-Chem Series 300 bottles
TBD = To Be Determined

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

5.1 Sample Collection Documentation

5.1.1 Field Notes

Field team members will keep a field logbook to document all field activities. Field logbooks will provide the means of recording the chronology of data collection activities performed during the investigation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

The logbook will be a bound notebook with water-resistant pages. Logbook entries will be dated, legible, and contain accurate and inclusive documentation of the activity. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned,
- The logbook number,
- Project name and number,
- Site name and location,
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of all sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook will include, but may not be limited to the following:

- Chronology of activities, including entry and exit times,
- Names of all people involved in sampling activities,
- Level of personal protection used,
- Any changes made to planned protocol,

- Names of visitors to the site during sampling and reason for their visit,
- Sample location and identification,
- Changes in weather conditions,
- Dates (month/day/year) and times (military) of sample collection,
- Measurement equipment identification (model/manufacturer) and calibration information,
- Sample collection methods and equipment,
- Sample depths,
- Whether grab or composite sample collected,
- How sample composited, if applicable,
- Sample description (color, odor, texture, etc.)
- Sample identification code.
- Tests or analyses to be performed,
- Sample preservation and storage conditions,
- Equipment decontamination procedures,
- QC sample collection,
- Unusual observations,
- Record of photographs,
- Sketches or diagrams, and
- Signature of person recording the information.

Field logbooks will be reviewed on a daily basis by the Field Team Leader. Logbooks will be supported by standardized forms.

5.1.2 Chain-of-Custody Records

Sample custody is discussed in detail in Section 5.2 of this Plan. Chain-of-custody (COC) records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in Section 5.2.2 of this Plan.

On a regular basis (daily or on such a basis that all holding times will be met), samples will be transferred to the custody of the respective laboratories, via third-party commercial carriers or via laboratory courier service. Sample packaging and shipping procedures, and field chain-of-custody procedures are described in Section 5.2.1 of this Plan.

5.1.3 Sample Labeling

Immediately upon collection, each sample will be labeled with a pre-printed adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier. The following identification scheme will be used:

A. The sample ID number will include the soil or monitoring well location, along with the sample depth, sample interval, and the depth interval at which it was collected.

Example:

Sample TRC-PX-S1(7) indicates the sample was taken by TRC and at post-excavation soil sample location S1, from 7 feet below ground surface.

Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, (e.g., Equipment Blank).

Examples:

Duplicate Sample: TRC-PX-S1A(7)
Equipment Blank Sample: GW Equip Blank 1
Trip Blank: Trip Blank 1

MS/MSDs will be noted in the comments column of the COC.

B. The job number will be the number assigned to the particular site.

Example: 163189

C. The analysis required will be indicated for each sample.

Example: VOC

D. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

Example: 07-24-12

E. Time will be the time the sample was collected, using military time.

Example: 1335

F. The sampler's name will be printed in the "Sampled By" section.

G. Other information relevant to the sample.

Example: Equipment Blank

An example sample label is presented below:

Site Name:	Former Cibro Petroleum Terminal
Client:	TRC
Sample No:	TRC-PX-S1(7)
Matrix:	Soil
Date Taken:	07/24/12
Time Taken:	1335
Sampler:	J. Miranda
Analysis:	VOC

Job No. _____
Client: _____
Sample Number _____
Date _____ Sample Time _____
Sample Matrix _____
Grab or Composite (explain) _____
Preservatives _____
Analyses _____
Sampler Signature _____

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples or the TRC Project QA Officer.

5.1.4 Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample or evidence file is considered to be under a person's custody if:

- the item is in the actual possession of a person;
- the item is in the view of the person after being in actual possession of the person;

- the item was in the actual physical possession of the person but is locked up to prevent tampering; and
- the item is in a designated and identified secure area.

5.1.5 Field Custody Procedures

Samples will be collected following the sampling procedures documented in Section 4.0 of this Plan. Documentation of sample collection is described in Section 5.1 of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures will ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.

- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample numbering system is presented in Section 5.1.3 of this Plan.

- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.

- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.

- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.

- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.

- If the samples are sent by common carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory sample custodian, and signature of the laboratory sample custodian on chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

5.1.6 Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will:

- Examine the shipping containers to verify that the custody tape is intact,

- Examine all sample containers for damage,

- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,

- Compare samples received against those listed on the chain-of-custody,

- Verify that sample holding times have not been exceeded,

- Examine all shipping records for accuracy and completeness,

- Determine sample pH (if applicable) and record on chain-of-custody forms,

- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,

- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the TRC Project QA Officer,

- Attach laboratory sample container labels with unique laboratory identification and test, and

- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

6.0 CALIBRATION PROCEDURES

6.1 Field Instruments

Field instruments will be calibrated according to the manufacturer's specifications. All calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings.

6.2 Laboratory Instruments

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies (summarized in Table 2 of this Plan). The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for this program. If site conditions were to warrant field analysis, TRC will prepare an addendum establishing the field analytical procedures. Analyses of all soil, sediment, groundwater and soil gas samples will be performed by Test America Laboratories in Edison, New Jersey. Table 2 summarizes the analytical methods to be used during this remedial investigation and action.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Appropriate QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation to support the generation of a Data Usability Summary Report (DUSR) according to New York State ASP Category B deliverable format requirements will be provided by the analytical laboratory for all investigation and post-excavation analytical data.

Project-specific procedures will be used to validate approximately 10% of the investigation and post-excavation analytical laboratory data. The investigation and post-excavation analytical data will also be submitted in the EQuIS™ electronic data deliverable (EDD) format. Analytical data generated only for the purpose of waste classification and off-site disposal will be submitted in accordance with New York State ASP Category A deliverable format requirements; no EDDs will be required for these data.

For all analyses, the laboratory will report results which are below the laboratory's reporting limit; these results will be qualified as estimated (J) by the laboratory. The laboratory will be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses of soil and groundwater sample analyses. For VOC analyses, the top 10 TICs will be reported. For SVOC analyses, the top 20 TICs will be reported.

8.1 Data Evaluation/Validation

8.1.1 Field Data Evaluation

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the Field Team Leader will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.

- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.

- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the Plan, and that any deviations were documented and approved by the appropriate personnel.

8.1.2 Analytical Data Validation

TRC will be responsible for performing an independent validation of the analytical data. Project-specific procedures will be used to validate approximately 10% of the investigation and post-excavation analytical laboratory data. Analytical data collected for the purpose of waste classification and off-site disposal will not be validated. The basis for the validation will be the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-08-01, (June 2008) and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, EPA 540-R-10-011 (January 2010), modified to accommodate the criteria in the analytical methods used in this program, and Region II Standard Operating Procedures (SOPs) for data validation. Tables 1A-1D, 2, 3A-3C and 4 highlight the QC criteria and holding time requirements for all analyses conducted under this program. These criteria will be used to evaluate and qualify the data during validation.

Validation will include all technical holding times, as well as QC sample results (blanks, surrogate spikes, laboratory duplicates, MS/MSDs, and LCSs), tunes, internal standards, calibrations, target compound identification, and results calculations.

The overall completeness of the data package will also be evaluated by the data validator. Completeness checks will be administered on all data to determine whether full data deliverables were provided. The reviewer will determine whether all required items are present and request copies of missing deliverables.

Upon completion of the validation, a report will be prepared. This report will summarize the samples reviewed, elements reviewed, any nonconformance with the established criteria, and validation actions. Data qualifiers will be consistent with EPA National Functional Guidelines. This report will be in a format consistent with NYSDEC's DUSR.

8.1.3 Identification and Treatment of Outliers

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions. In many cases, two data sets may be reported, one including, and one excluding the outlier.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

9.0 INTERNAL QUALITY CONTROL

The subcontracting laboratory Quality Assurance Project Plan will identify the supplemental internal analytical quality control procedures to be used. At a minimum, this will include:

- Matrix spike and/or matrix spike duplicate samples
- Matrix duplicate analyses
- Laboratory control samples
- Instrument calibrations
- Instrument tunes for SW-846 8260B and 8270D and EPA Method TO-15 analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes SW-846 8260B and 8270D and EPA Method TO-15 analyses
- Quantitation limit determination and confirmation by analysis of low-level calibration standard

Field quality control samples will include:

- Equipment blanks as outlined in Table 4
- Field duplicate samples as outlined in Table 4
- Trip blanks as outlined in Table 4
- MS/MSDs described in Section 4.8

10.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of TRC's Project QA officer. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the Plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or the TRC Program Manager. The corrective action will usually involve recalculation, reanalysis, or resampling.

10.1 Immediate Corrective Action

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Plan), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The Field Team Leader will approve the corrective action and notify the TRC Program Manager. The TRC Program Manager will approve the corrective measure. The Field Team Leader will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field record book. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals.

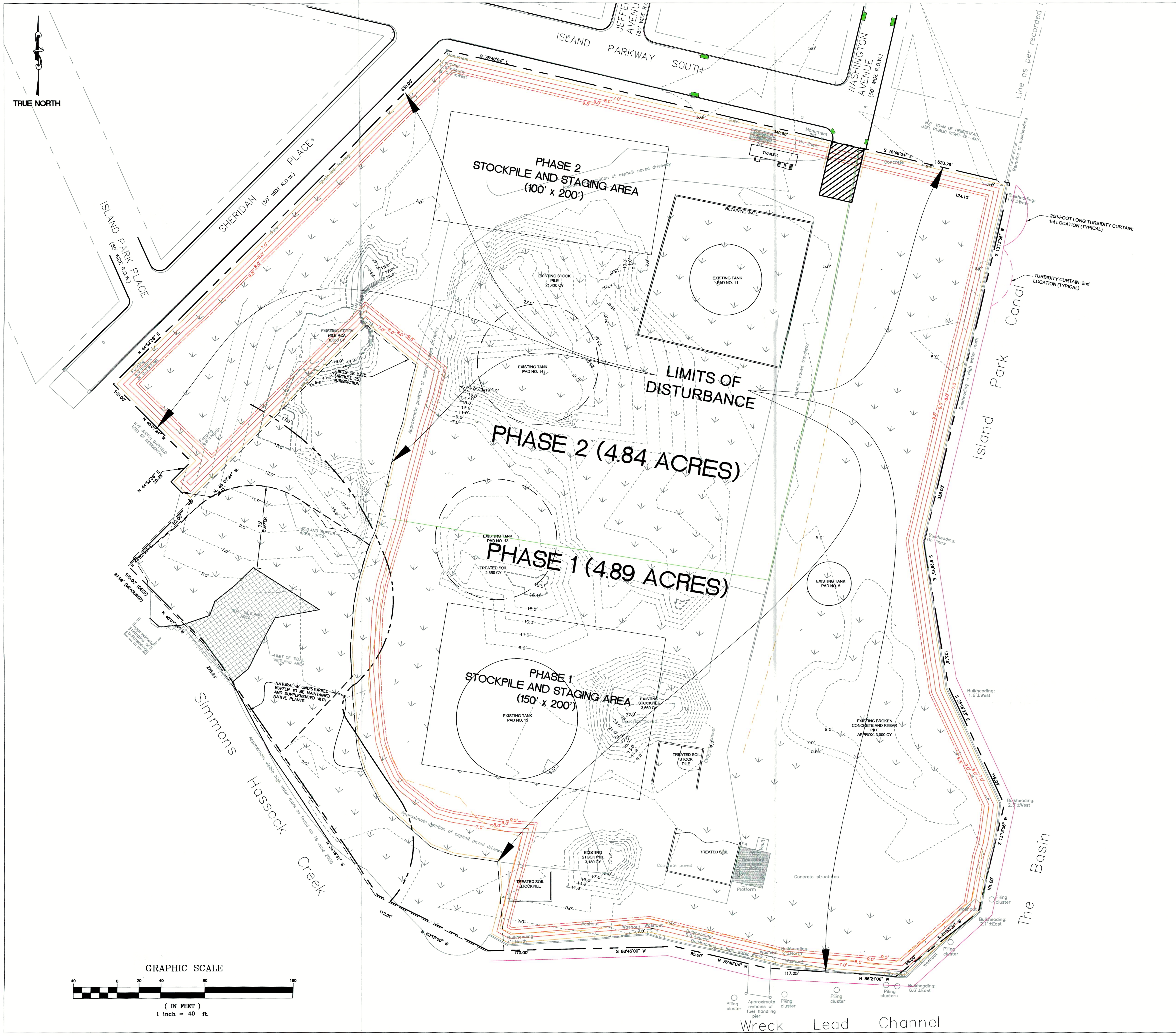
No staff member will initiate corrective action without prior communication of findings through the proper channels.

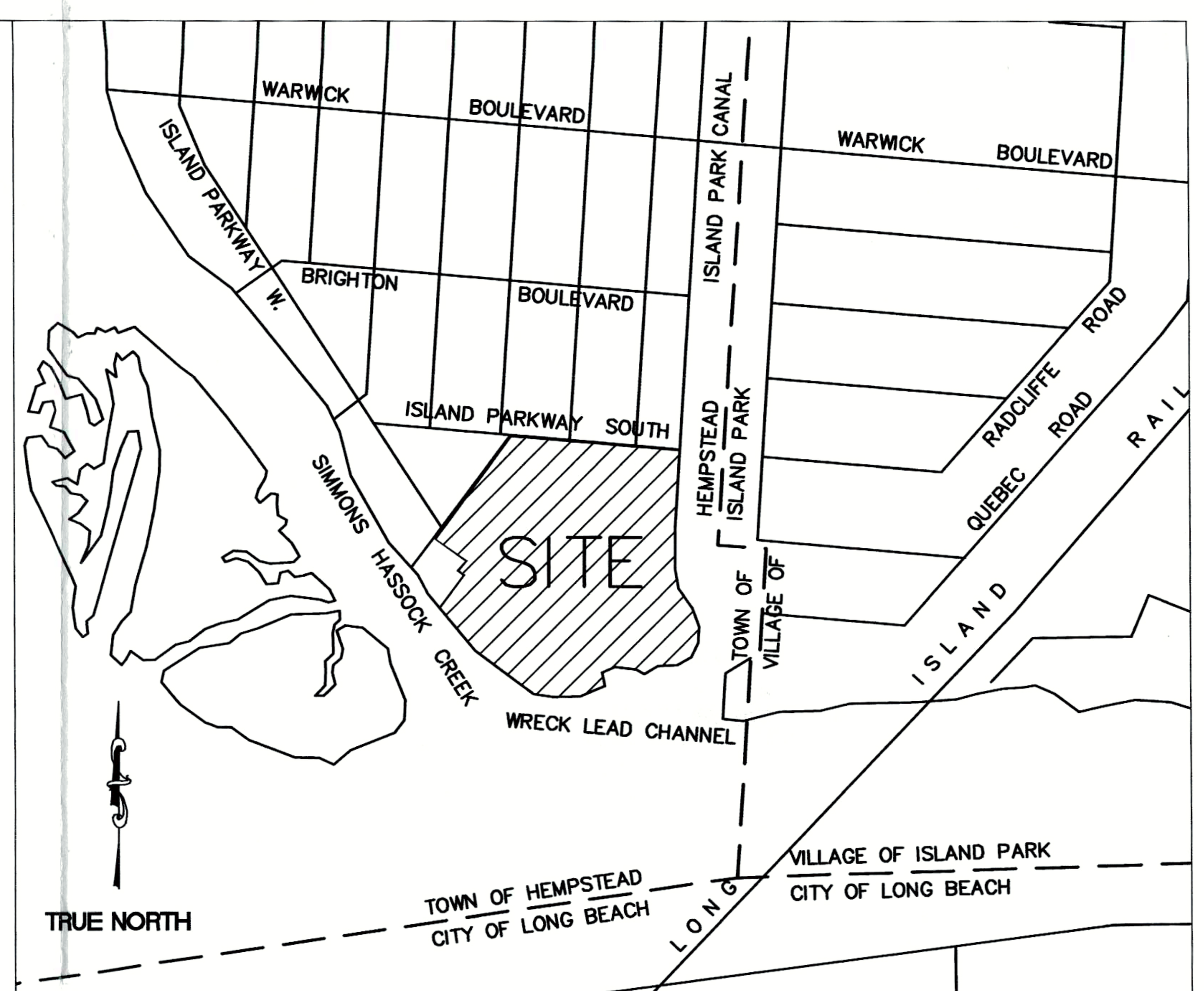
Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the TRC Project QA Officer will be notified. The TRC Project QA Officer will notify the TRC Program Manager, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to the TRC Program Manager. If the corrective action does not rectify the situation, the laboratory will contact the TRC Program Manager, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, the contractor will apply formalized long-term corrective action, if necessary.





LOCATION MAP
SCALE 1" = 500'

LEGEND (SYMBOLS NOT TO SCALE):

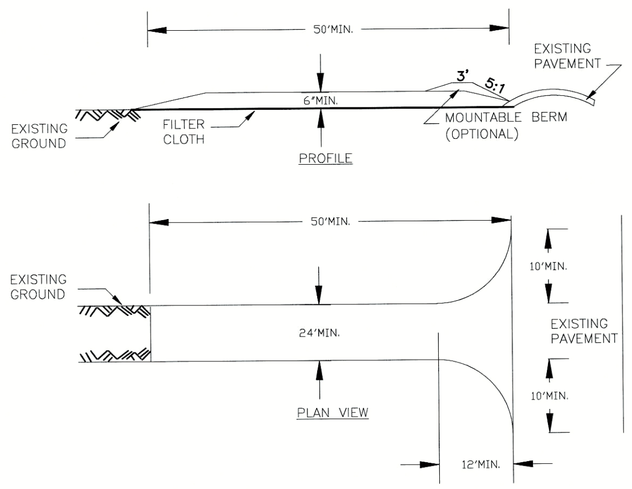
- STABILIZED CONSTRUCTION ENTRANCE
- STORMWATER INLETS TO BE PROTECTED
- EXISTING VEGETATION
- EXISTING GRADE CONTOUR
- EXISTING SILT FENCE
- PROPOSED SILT FENCE
- PHASE BOUNDARY
- PROPERTY LINE
- TURBIDITY CURTAIN LOCATIONS
- PROPOSED GRADE CONTOUR
- PROPOSED TOP OF SLOPE

REMEDIAL WORK PLAN
BCP SITE NO. C130153
FORMER CIBRO PETROLEUM TERMINAL SITE
ISLAND PARK, NEW YORK

TRC
1430 BROADWAY, 10TH FLOOR
NEW YORK, NEW YORK 10018

	DESIGNED BY: JM	DATE: AUGUST 2012
	DRAWN BY: HD	SCALE: AS SHOWN
SWPPP-2	CHECKED BY: JM / SM	PROJECT NUMBER: 163189.0100.0000

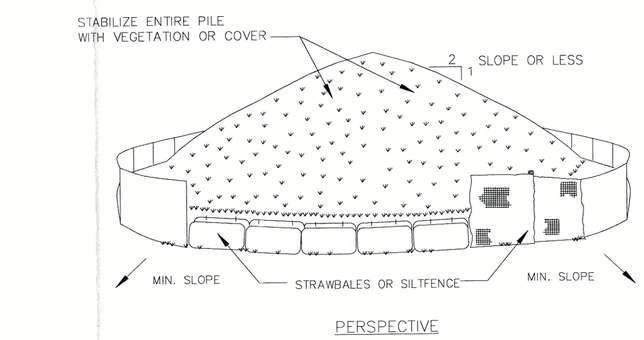
DRAWING TITLE:
EROSION AND SEDIMENT CONTROL PLAN



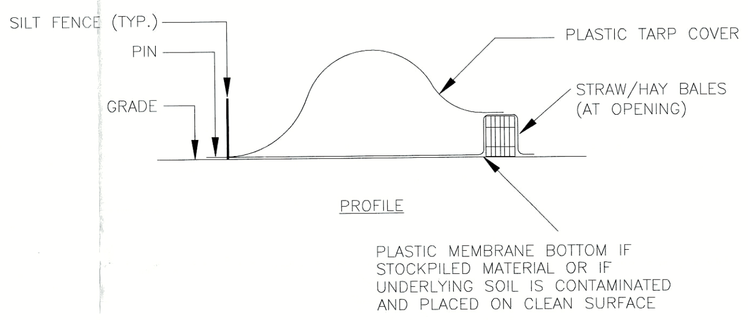
NOTES:

1. STONE SIZE – USE 1"–4" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – NOT LESS THAN 50 FEET.
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWENTY–FOUR (24) FOOT MINIMUM, FOR SINGLE ENTRANCE TO SITE, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ACCESS | 1
NOT TO SCALE



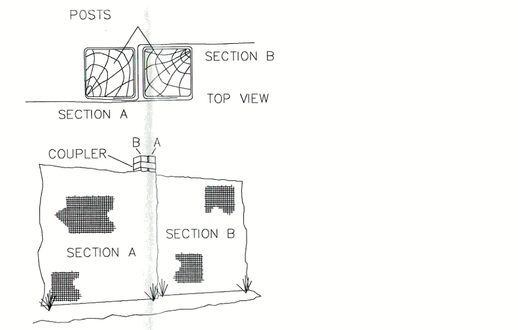
PERSPECTIVE



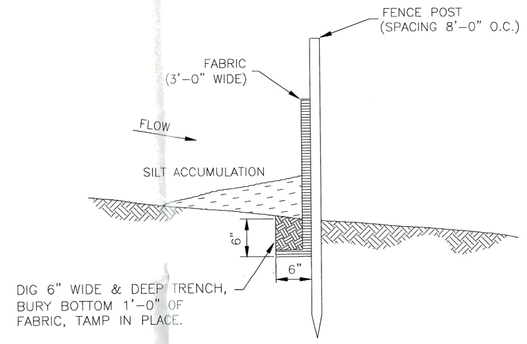
NOTES:

1. AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF STOCKPILE SHALL BE 1:2.
3. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH SILT FENCING AND STRAWBALES, THEN STABILIZED WITH VEGETATION OR COVERED.

TYPICAL SOIL STOCKPILE | 2
NOT TO SCALE



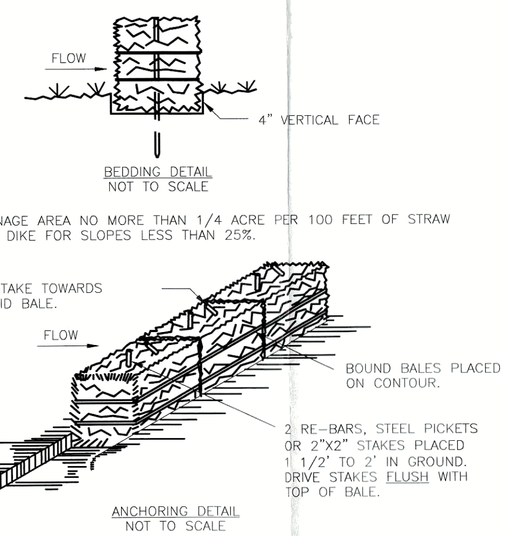
JOINING SECTIONS OF FENCING



NOTES:

1. SILT FENCE SHALL BE PREFABRICATED. UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
2. JOIN SECTIONS AS SHOWN ABOVE.
3. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

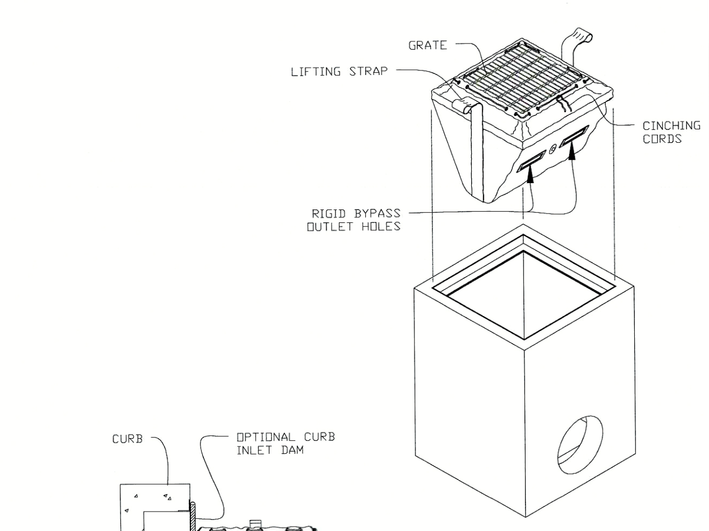
SILT FENCE CONSTRUCTION AND INSTALLATION DETAIL | 3
NOT TO SCALE



NOTES:

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE–BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

STRAW BALE DIKE | 4
NOT TO SCALE

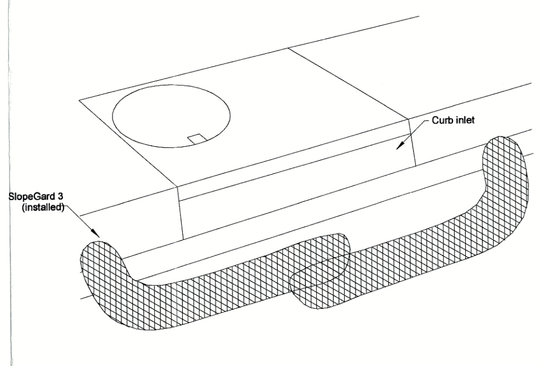


SECTION VIEW
-INSTALLED-
WITH OPTIONAL CURB INLET DAM

NOTES:

1. FLOGARD T–BAG IS MANUFACTURED FROM WOVEN MONOFILAMENT POLYPROPYLENE FABRIC. OTHER MATERIALS AVAILABLE UPON REQUEST.
2. MAY BE ORDERED WITH FOSSIL ROCK OIL ABSORBENT POUCHES INSTALLED.
3. OPTIONAL CURB INLET DAM AVAILABLE UPON REQUEST.
4. PERIODIC MAINTENANCE IS REQUIRED. FLOGARD T–BAG SHOULD NEVER BE ALLOWED TO FILL BEYOND THE TOP OF THE BYPASS OUTLET LOUVERS.
5. APPROPRIATE LIFTING EQUIPMENT SHOULD BE USED WHEN PERFORMING PERIODIC MAINTENANCE.

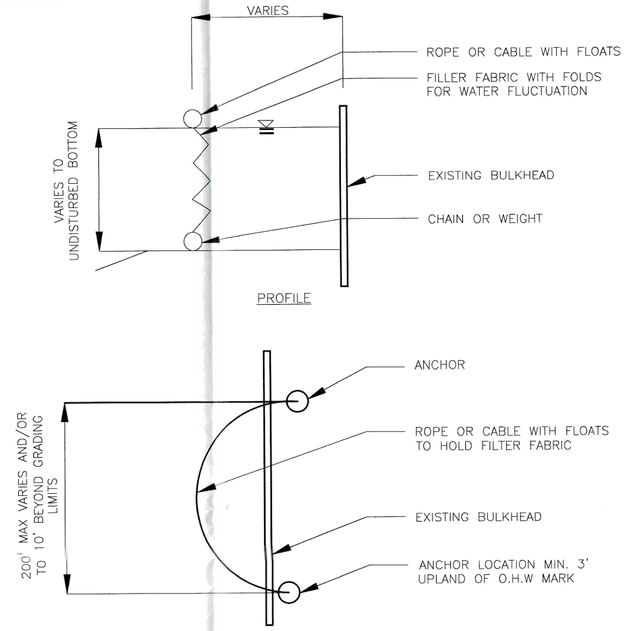
T-BAG
TEMPORARY INLET PROTECTION DEVICE | 5
NOT TO SCALE



NOTES:

1. PLACE AN ADEQUATE NUMBER OF SLOPEGARD 3 ROLLS AROUND AN INLET TO PROVIDE COMPLETE PROTECTION. LEAVE APPROXIMATELY 3"–6" BETWEEN THE SLOPEGARD 3 ROLLS AND THE INLET. ENDS SHOULD OVERLAP ABOUT 12 INCHES.
2. INSPECT INLET PROTECTION DEVICE BEFORE AND AFTER RAIN EVENTS, AND WEEKLY THROUGHOUT THE RAINY SEASON. DURING EXTENDED RAIN EVENTS, INSPECT AT LEAST ONCE EVERY 24 HOURS.
3. REMOVE AND PROPERLY DISPOSE OF ACCUMULATED SILT AND DEBRIS TO ALLOW FOR PROPER FUNCTION OF DEVICE.

SLOPEGARD
SEDIMENTATION CONTROL DEVICE | 6
NOT TO SCALE



NOTES:

1. TURBIDITY CURTAIN SHALL BE LOCATED BEYOND LATERAL LIMITS OF THE ACTIVE CONSTRUCTION SITE.
2. THE HEIGHT OF THE CURTAIN SHALL BE 20% GREATER THAN THE DEPTH OF THE WATER AT HIGH TIDE.
3. SUPPLEMENTAL ANCHORS OF THE TURBIDITY CURTAIN TOE SHALL BE USED, DEPENDING ON WATER SURFACE DISTURBANCES.
4. THE TURBIDITY CURTAIN SHALL BE INSPECTED DAILY AND REPAIRED OR REPLACED IMMEDIATELY, IF DAMAGED.
5. ANY FLOATING DEBRIS SHALL BE IMMEDIATELY REMOVED AND FREQUENT CHECKS OF THE ANCHORAGE SHALL BE MADE.

TURBIDITY CURTAIN | 7
NOT TO SCALE

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (AUGUST 2005) AND THE NYSDEC SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITY (PERMIT NO.GP–0–10–001).
2. CONSTRUCTION SHALL BE SEQUENCED IN ACCORDANCE WITH THE CONSTRUCTION WORK PLANS AND SWPPP.
3. CUT OR FILL SLOPES STEEPER THAN 3:1 SHALL BE STABILIZED IMMEDIATELY AFTER GRADING.
4. PAVED ROADWAYS SHALL BE KEPT CLEAN AT ALL TIMES.
5. THE SITE SHALL AT ALL TIMES BE GRADED AND MAINTAINED SUCH THAT ALL STORMWATER RUNOFF IS DIVERTED TO SOIL EROSION AND SEDIMENT CONTROL FACILITIES.
6. ALL STORM DRAINAGE OUTLETS SHALL BE STABILIZED, AS REQUIRED, BEFORE THE DISCHARGE POINTS BECOME OPERATIONAL.
7. CONSTRUCTION FENCING SHALL BE USED TO PROTECT ANY EXISTING TREES TO REMAIN, WETLANDS AND OTHER SENSITIVE AREAS.
8. IF FOR ANY REASON THE CONSTRUCTION IS HALTED FOR PROTRACTED PERIODS, THE CONTRACTOR SHALL STABILIZE THE SELECT MATERIAL BY HYDRO–SEED OR OTHER MEANS, TO THE SATISFACTION OF THE ENGINEER FOR AREAS WITHOUT ADEQUATE VEGETATION.
9. DUST CONTROL – WATER SHALL BE APPLIED BY SPRINKLER OR WATER TRUCK AS NECESSARY TO MINIMIZE SEDIMENT TRANSPORT AND MAINTAIN ACCEPTABLE AIR QUALITY CONDITIONS. REPETITIVE TREATMENTS SHALL BE DONE AS NEEDED UNTIL SURFACES ARE STABILIZED.
10. THE CONTRACTOR SHALL INSPECT THE EFFECTIVENESS AND CONDITION OF EROSION CONTROL DEVICES AT LEAST ONCE EVERY SEVEN DAYS.
11. THE CONTRACTOR SHALL REPAIR OR REPLACE DAMAGED EROSION CONTROL DEVICES IMMEDIATELY, AND IN NO CASE, MORE THAN TWENTY–FOUR (24) HOURS AFTER OBSERVING SUCH DEFICIENCIES.
12. THE CONTRACTOR SHALL BE PREPARED TO IMPLEMENT INTERIM DRAINAGE CONTROLS AND EROSION CONTROL MEASURES AS MAY BE NECESSARY DURING THE COURSE OF CONSTRUCTION.
13. THE CONTRACTOR SHALL MAKE AVAILABLE ON–SITE EQUIPMENT, MATERIALS AND LABOR NECESSARY TO EFFECT EMERGENCY EROSION CONTROL AND DRAINAGE IMPROVEMENTS WITHIN FOUR (4) HOURS OF ANY IMPENDING EMERGENCY SITUATION.
14. ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL FINAL ACCEPTANCE OF THE SITE WORK BY THE ENGINEER. UPON CERTIFICATION OF FINAL ACCEPTANCE, THE OWNER WILL ASSUME RESPONSIBILITY FOR THE CONTINUED MAINTENANCE OF SOIL EROSION AND SEDIMENTATION CONTROL MEASURES.

REMEDIAL WORK PLAN
BCP SITE NO. C130153
FORMER CIBRO PETROLEUM TERMINAL SITE
ISLAND PARK, NEW YORK

TRC
1430 BROADWAY, 10TH FLOOR
NEW YORK, NEW YORK 10018

DESIGNED BY:	DATE:
JM	AUGUST 2012
DRAWN BY:	SCALE:
HD	AS SHOWN
CHECKED BY:	PROJECT NUMBER:
JM / SM	163189.0100.0000

SWPPP-3

DRAWING TITLE:

EROSION AND SEDIMENT CONTROL DETAILS

Appendix E
Community Air Monitoring Plan (CAMP)

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

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

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the

work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix F
Resumes

TRC

STEVEN D. MEERSMA, PE

PROPOSED ROLE FOR IEH ENVIRONMENTAL CONSULTING/HAZARDOUS MATERIAL SERVICES CONTRACT
Senior Engineer

EDUCATION
B.S., Civil Engineering, University of Michigan, 1985

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS
Professional Engineer, New York
Professional Engineer, New Jersey
Professional Engineer, Delaware
Certified Underground Storage Tank Subsurface Evaluator, New Jersey

AREAS OF EXPERTISE
Mr. Steven D. Meersma, P.E. has a 25-year record of providing high-quality environmental engineering services to a broad range of government agencies and private sector concerns primarily in New York State and New Jersey. He has managed many large and complex multi-phase remedial investigation, design, construction, and site management projects. Through his extensive experience Mr. Meersma has program management and technical expertise in the following general areas:

- Environmental Regulatory Compliance
- Environmental Assessments and Audits
- Remedial Design and Construction
- Construction Management
- Groundwater Remediation
- Underground Storage Tank Management
- Geotechnical Engineering
- Solid Waste Management
- Wastewater Treatment

Based in TRC's New York City office, Mr. Meersma is an Assistant Vice President in TRC's Remediation and Site Assessment Practice.

A short list of references is provided below.

REFERENCES			
Name	**Title**	**Address**	**Telephone No. & E-mail Address**
Maria Hall	Asst. Project Manager	Long Island Rail Road Capital Program Management 144-41 94th Ave. Mail Code 1913 Jamaica, NY 11435	(718) 558-3826 mthall@lirr.org

REFERENCES			
Name	**Title**	**Address**	**Telephone No. & E-mail Address**
Drew Pardus	President	Pardus Consulting LLC c/o: NYCSCA 30-30 Thomson Long Island City, NY 11101	(646) 577-8280 dpardus@tmo.blackberry.net
David Rubin, P.E.	Project Manager	Consolidated Edison Co. of NY EH&S Division Remediation Group 31-01 20th Avenue, Bldg 138, 2nd Floor Long Island City, NY 11105	(718) 204-4219 rubind@coned.com

REPRESENTATIVE EXPERIENCE (Descriptions marked with an asterisk (*) undertaken within past three years)

New York City School Construction Authority, PCB Caulk Pilot Study, New York City, NY*

Mr. Meersma currently serves as the Task Manager responsible for the preparation of the remedial investigation work plan, remediation investigation report, and feasibility study for the evaluation of PCB Caulk in New York City public schools constructed between 1950 and 1978. This pilot program is being conducted by the SCA and the City of New York in cooperation with the USEPA in accordance with a Consent Order and Final Agreement, and is intended to result in a preferred remedy to be implemented at New York City public schools. The intent of the work is to evaluate the possible presence of PCB containing building materials in primary, transitory and outside exposure areas and evaluate preferred remedial strategies with consideration of effectiveness of remedy, logistics, disruption to educational activities and overall costs. In addition to helping design the scope of the remedial investigations, Mr. Meersma also assisted in the planning, scheduling and client coordination aspects of the implementation of pilot studies and subsequent investigation and remediation in the first three of five pilot schools during the summer of 2010.

Former Consolidated Edison Waterside Steam Generating Station, Manhattan, NY*

Mr. Meersma served as Professional Engineer of Record for the $103 million decommissioning, demolition and soil and groundwater remediation of the four individual properties in Midtown Manhattan, totaling nine acres, comprising the former Consolidated Edison Waterside Steam Generating Station, which has been slated for residential and commercial redevelopment. Former site uses included a 100-year old steam generating station, a manufactured gas plant, a petroleum storage terminal, a fleet fueling depot and an office building. The project was performed under the Voluntary Cleanup Program (NYSDEC VCP Site Nos. V00429 - V00432), with TRC as a Volunteer. Mr. Meersma was responsible for the review and approval of detailed task-specific work plans for all elements of the work and regulatory and safety management of the program.

Ferry Point Park, Bronx, NY*

Mr. Meersma has provided ten years of technical and managerial services in connection with

the permitting, remediation, site/civil and environmental engineering, and construction at Ferry Point Park, a 220-acre former landfill being developed into a golf course and community and waterfront parks in the Bronx, New York. Mr. Meersma served as the Program Manager for multiple contracts with the New York City Department of Parks and Recreation related to NYSDEC 6 NYCRR 360 Permit compliance and fill import, engineering design, and construction management. Mr. Meersma oversaw the design and construction of an approximately two mile-long vent trench to isolate landfill gases from the neighboring community. He developed the Soil Management Program and other environmental aspects of the Engineering Plan, detailing the sampling, analytical laboratory testing and on-site management of two million cubic yards of imported fill material and cover layer material to re-grade and cover the landfill. Mr. Meersma also supervised the design of a site-wide landfill gas control system and sub-slab depressurization systems for several park-related buildings being constructed on the former landfill.

Remediation of Operable Units (OUs) 1 and 2, Queens West Development – Stage 2 Site, Long Island City, Queens, NY*

Mr. Meersma served as Project Manager and Engineer of Record for the $25 million fast-track remediation of operable units (OUs) 1 and 2 of the Queens West Development – Stage 2 Site, an approximately 12-acre portion of the former oil refinery and industrial site in Long Island City, Queens. The remediation of OUs 1 and 2 was performed under the Voluntary Cleanup Program (VCP Site Nos. V00505A and V00505B). Remediation and environmental conditions included contaminated sediments, separate phase free product, buried former refinery systems, metals contamination in soil, volatile organic contamination of soil and groundwater, and site-wide urban fill. Mr. Meersma also served as technical reviewer for the design of active sub-slab depressurization systems for two high-rise residential buildings at the site, and he has supervised implementation of the site management plans for OUs 1 and 2.

New York City Economic Development Corporation, Waste Characterization and Disposal and Site Remediation – Brooklyn and Staten Island, NY

Mr. Meersma served as the Technical Director for removal and disposal of over 50 drums and miscellaneous containers filled with various, unidentified wastes at sites in Brooklyn and the Bronx. Developed and implemented a drum characterization plan for the drums, prepared a drum sampling report, developed the drum removal plans and specifications, provided oversight and management of the drum removal and disposal activities. Engineer of record for the remediation of soil and groundwater contamination at a former rail yard in Staten Island, New York developed into a waterfront park and the New York Yankees minor league St. George baseball stadium.

New Jersey Transit (NJT) Hudson-Bergen Light Rail Transit System (H-BLRTS)

Mr. Meersma served as the Project Manager for the environmental aspects of the design and construction of the New Jersey Transit (NJT) Hudson-Bergen Light Rail Transit System (H-BLRTS). In this capacity, Mr. Meersma was responsible for the day-to-day management of a large multi-disciplined professional staff and a multi-million-dollar budget. The 20-mile long project corridor is located in a highly urbanized area and involved construction of a large maintenance and storage facility, 13 passenger stations, and six bridges. Historic waste disposal activities had resulted in widespread soil and groundwater contamination of the

project corridor. Under a Memorandum of Agreement, NJT was responsible for remediating the areas impacted by the construction of the H-BLRTS. During the Initial Operating Segment construction phase of the project, Mr. Meersma was responsible for the oversight of all hazardous materials remediation activities including: closure of approximately 25 underground storage tanks, remediation of soil and groundwater impacted by leaking underground storage tanks, decontamination and demolition of over 40 buildings and structures, management of contaminated groundwater, and management of over 500,000 cubic yards of hazardous and contaminated soil and debris.

Consolidated Edison Company of New York, Inc., On-Call-As Needed Subject Matter Expert Contract – New York, NY*

Mr. Meersma serves as Project Manager for multiple task order type Con Edison contracts. This On-Call, As Needed Subject Matter Expert contract involves providing senior-level technical specialist for a wide variety of assignments, including Safety Inspection Program Assessment and Development, SEQR EAF Long Form completion for divestiture of the Mid-Hudson properties, Root Cause Analysis of a radioactive release at the Indian Point 2 nuclear generating facility, property acquisition and divestiture support. Assignments on the Corporate Procedures Support contract have included updating existing Corporate Environmental Procedures (CEP) pertaining to polychlorinated biphenyl (PCB) management, development of DOT Hazardous Materials Management CEPs, and developing a detailed reportable quantity matrix for over 360 commonly used hazardous substances. Mr. Meersma participates in high-level scoping and development meetings, develops assignment scopes of work and budgets, administers the contract financial aspects, identifies and mobilizes the SMEs and provides senior-level review of project deliverables.

L'Oreal USA, Inc., Environmental Consulting Master Services Agreement – Various Locations, North America and Caribbean

Mr. Meersma serves as Project Manager for this task order contract involving due diligence, permitting, air and wastewater treatment design, investigation and remediation at various locations at the request of L'Oreal. Project sites typically consist of operating cosmetics facilities and distribution warehouses operated by L'Oreal or potential acquisition targets. Participate in project scoping meetings, develop detailed assignment scopes of work and budgets, administer the contract financial aspects, identify and mobilize multi-office and discipline project staffing, and provide senior-level review of project deliverables.

Confidential Utility Company, Due Diligence Support – NY, PA, and NJ

Lead engineer responsible for the fast-track evaluation of existing environmental data pertaining to over twenty power generating facilities being considered for acquisition. Mr. Meersma prepared a confidential report of findings presenting a summary of the identified and potential environmental concerns and estimated costs for corrective actions.

United States Army Corps of Engineers, Water Distribution System Correction and Improvement Study Project Definition Report – Fort Hamilton, Brooklyn, NY

Mr. Meersma served as Project Manager for performance and preparation of a Water Distribution System Correction and Improvement Study Project Definition Report for the U.S. Army Garrison, Fort Hamilton facility in Brooklyn, New York. The report described the

investigation phase which involved review of historical drawings and records; interviews with Fort Hamilton personnel familiar with the system; a survey the system's physical condition; collection of water samples for water quality analysis; performance of fire-flow tests; and application of computer modeling to simulate the system performance under various conditions. The report also included an evaluation of the system for compliance with applicable federal, state, army and local rules and regulations for historical and current water quality; fire fighting capabilities; and physical condition. Recommendations and cost estimates for system improvements and modifications were also included.

SPECIALIZED TRAINING

- 120-Hour Project Manager/ Mentoring Training
- Total Quality Management Basic and Leadership Training
- 40-Hour OSHA Hazardous Waste Operations and Emergency Response Training
- 8-Hour OSHA Hazardous Waste Operations and Emergency Response Training
- Supervisory OSHA Hazardous Waste Operations and Emergency Response Training

PROFESSIONAL AFFILIATIONS

- Chi Epsilon, Honorary Civil Engineering Society
- American Society of Civil Engineers
- Water Environment Federation

Appendix G
Cost Estimate

HARBOR ISLE ESTATES
ENVIRONMENTAL CLEAN-UP COST ESTIMATE

ITEM DESCRIPTION	TOTAL COST
BOOM\MAINTENANCE	$ 3,000.00
ASBESTOS ABATEMENT	$ 5,000.00
3000-GAL TANK REMOVAL	$ 15,000.00
BULKHEAD RECONSTRUCTION	$ 2,000,000.00
SOIL EXCAVATION AND DISPOSAL	$ 2,250,000.00
DEMOLITION AND REUSE	$ 750,000.00
EX SITU SOIL REMEDIATION INCLUDING EXCAVATION (30,000 TN)	$ 900,000.00
GROUNDWATER MANAGEMENT	$ 3,000.00
FILL FOR EXCAVATIONS	$ 150,000.00
FILL TO RAISE GRADE	$ 1,065,000.00
CLEAN FILL COVER	$ 1,800,000.00
INSITU WATER TREATMENT(ORC) - CONTINGENCY	$ 60,000.00
SAMPLING AND LABORATORY ANALYSIS	$ 150,000.00
MONITORING WELLS (SHALLOW)	$ 6,000.00
CONSULTING ENGINEERING	$ 125,000.00
FER/SMP/EA	$ 50,000.00

TOTAL ESTIMATED ENVIRONMENTAL CLEAN-UP COSTS $ 9,390,000.00